THE RELATIONSHIP BETWEEN MODES OF PERCEPTION AND SELECTED VARIABLES IN YOUNG CHILDREN

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THE SEARCH FOR TRUTH

The beginnings of all priesthoods seem to be confused with those of magic. From the unabashed rainmaker to the sophisticated and possibly cynical custodian of that Egyptian wisdom which was not for the tillers of the fields and the hewers of stone, is not so long a step, and from him to the ruler of men's minds in the Middle Ages is but a stride. Their motives, we may believe, were sincere. They themselves believe in the magic, the utility, or the sanctity of that which they dispersed as rapidly as their unenlightened followers could receive the blessing. But the sincerity of a belief is not a sufficient guarantee that it will benefit others who are forced by authority or decoyed by mis-education into giving it credence. So we may well ask whether the magicians and their successors were not rationalizing their close-fistedness into open-handed generosity. The desire to withdraw from the tribe, to be both above the common run of men and away from them while not indifferent to the flattery of their wonder and respect, is as common today among those who, sub-consciously perhaps, are doubtful of themselves and of what they have to offer their fellowmen, as it was when the first hairy fakirs withdrew to the shelter of their caves to fatten on the offerings of harder-working mortals. Prestige is the greatest labor-saving device our ingenious race has ever invented. And there is no preservative so potent to ward off the natural decay of prestige as a strong infusion of supernaturalism. What cannot be approached or tested by mortal hands or mortal minds is beyond all destructive human inquiry. The only way of overcoming it is to ignore the rumor of its existence (Eric Bell, 1932, p. 289).

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CHAPTER I

THE PROBLEM AND PURPOSE OF THE STUDY

Introduction

The scientific study of human behavior is not yet a hundred years old, yet its avenues into human understanding have been broad and sweeping. Those familiar with the upward climb of this discipline to establish itself as a science can testify to the many fantasies and half-baked theories that were often found lurking in the best intentions of even the most able. The birth of the concept of science was an attempt to remedy this situation. Its methodology, when understood, appears at least as important to the very survival of a modern civilization as it does to the practice of science.

Underlying the development of scientific methodology was a fundamental attitude or approach to life. It manifests itself in the characteristic manner in which sane men found it necessary to cope with their needs. Typically they first had to agree that there was a problem and furthermore that it was worth their consideration. They next had to formulate fundamental rules which each could fully understand and accept. And third, the solution had to be such that any other sane man, either then or in the future, proceeding by the rules agreed upon, would reach precisely

the same conclusions from the given facts of the problem. In man's effort to make sane a world full of "sound and fury" this, without a doubt, stands as one of his greatest achievements.

Science has manifest itself in many ways in psychology. One can find it in the rigid methodology of Wundt, the brass laboratory of Galton, the atomistic preciseness of Titchener, and the testing movement in this country as advanced by Cattell and Thurstone, to mention but a few. Its ultimate purpose has usually been in the interest of mankind. The needs of the people not being met by traditional methods have often forced a reliance on the newer and less familiar scientific methods. Its success as a tool in predicting nature's whims has greatly aided man in his effort to make his world a better place in which to live. Needless to say, however, the transition, though largely beneficial, has generated numerous unforeseen social and psychological problems.

Many view this as a natural phenomenon in the process of man's evolution from whatever he used to be to whatever he may become in the distant future. Regardless of the cause, people must deal with their problems as they find them. In this country we are faced with many problems on an international as well as a national scale. One of these is the intellectual race. The question is often asked, "How can we help people to more effectively satisfy not only their own needs, but also the needs of their society?" In a sense, then, are we not asking how we can help each individual to become a more effective person?

Another pressing question asked by many who have seen the need for world peace is how can we help people to learn to live with individual differences? For the teachers who are faced daily with this problem, how can we hope to meet the multitude of independent needs due to individual differences? The scientific method has been utilized to great advantage in attempting to resolve these problems. We find evidence of this fact in the multitude of research reported in the professional literature and in the coordinated efforts of both private and public groups and organizations to sponsor research.

The research undertaken by the writer was an attempt to hasten the solution of one of our country's most pressing needs, namely, that of discovering more effective means for developing human potential. Such a need, it was felt, can only be met through an enrichment of our present understanding of individual differences.

The Problem

The original plan of this study was to investigate the developmental level of perceptual differentiation (extent of articulation) achieved in young children extending from the nursery school through the second grade. The accomplishment of this task called for focusing attention on three independent variables, sex, grade level, and chronological age, and their association with a number of dependent variables found in two perceptual tasks involving both social and non-social stimuli.

It was discovered later that the research could be extended to include six more second grade children plus five boys and five girls from the third grade. Unfortunately the limited availability of these children did not permit their exposure to the perceptual task involving the social stimulus. With respect to the non-social stimulus, however, it was felt that the inclusion of these children was particularly advantageous due to the increase in sample size and the addition of another grade level.

The three independent variables in this study were, therefore, grade level, sex, and age. There were 18 dependent variables, seven which could be derived from the Self-Other Recognition Test (SORT) and 11 from a modified Rod and Frame Test (MRFT). Principally, then, this was an investigation of the association between the three independent variables (sex, grade level, and age) with a number of dependent variables contributed by the two perceptual tasks.

It was the hope of this investigator that the variables associated with the Modified Rod and Frame Test (MRFT) would be sufficiently correlated to permit grouping them as a single factor. Witkin and others who have used the Rod and Frame Test (RFT) were able to successfully accomplish this. The RFT factor, as it might be termed, was then employed by Witkin as a measure of "field dependence." Consequently, the writer was interested not only in deriving a single factor from the task but also results similar to those achieved by Witkin, supporting the validity of the Modified Rod and Frame Test (MRFT) as a valid measure of field

dependence. In a sense then, if we might optimistically anticipate a single MRFT factor, the study was to explore the relationship between grade level, sex, and age in young children with "field dependence" as estimated by a modified Rod and Frame Test (MFRT) plus a number of other perceptual variables obtained from the Self-Other Recognition Test (SORT).

Need for the Study

Witkin and his colleagues have used the term "field dependence" to refer to a developmental concept of psychological differentiation (Witkin et al., 1962). Operationally, it implies a marked inability to accurately judge the position of a figure in relation to themselves when the figure is embedded or surrounded by a field of misleading cues. Probably the most well-known measure of field dependence is the RFT (Rod and Frame Test). In this test, the subject is presented with a luminous rod surrounded by a luminous square frame, both of which have been tilted approximately 30 degrees from the vertical. During the test, the room is darkened, leaving only the rod and frame visible to the subject. The subject is then asked to position the rod to the vertical.

As Witkin and others using this technique soon discovered in their exploration of perceptual style, the problem for some can be found in the difficulty encountered in overcoming the influence of the frame. The assumption made is that the subjects who make the largest errors in their adjustment of the rod are depending too much on the visual cues afforded by the frame or field for their

reference rather than themselves. The underlying factor may be one of poor utilization and/or inadequate development of sensitivity to kinesthetic cues. In either case, early environmental learning would seem to have played a crucial role.

One of the questions probed by this research concerned developmental onset. Since in the past, the popular measures of field dependence have been largely limited to children above the age of eight, relatively little was known concerning field dependence in younger children. It seemed, therefore, that any research initiated for purposes of exploring the various levels of differentiation in the younger child would be profitable.

Witkin and his co-workers have demonstrated a developmental trend in children's perceptual styles progressing from a relatively global approach (field dependent) to a more analytical approach (field independent). It is clear now that the course of this development trend may be related to the child's early life experiences (Seder, 1957; Witkin et al., 1962).

Longitudinal studies of perceptual development have shown substantial correlations between tests and retests from eight to thirteen and from ten to seventeen years of age. Such findings lend strong support to the notion of field dependence as a fairly stable variable. Probably of more significance, however, than the suggestion of stability is the implication that an individual's characteristic approach to the world may be largely determined by the age of eight. If such were true, we could hardly overestimate the urgency for extensive research in this area of child development.

During the spring of 1965 a study was undertaken by the investigator to explore the relationship between field dependence as measured by an embedded figure test and the ability to identify the self and others from physiognomic cues (Appendix A). The subjects included 22 seventh graders from the P. K. Yonge Laboratory School at the University of Florida. The interest for this research grew out of a number of studies cited by Witkin et al. (1962) in reference to the articulation of the body image. It was their opinion that the more "global" individual, because of his greater dependency would have experienced a greater need for paying attention to facial cues. Hence, the argument was for a positive relationship between field-dependence and the ease with which one is able to identify others from photographs. From the studies referred to above, this would seem to be the case.

On the other hand, field-independent persons have been shown to have achieved a higher level of differentiation of their own body from the environment. This has been demonstrated with projective techniques. Witkin has attempted to explain this apparent contradiction by referring to the superior ability of field-dependent types to identify themselves and others from photographs as a case of superficial articulation. The results of the previously mentioned pilot study apparently do not support such a hypothesis (Appendix A). The findings clearly indicate that, in general, the field-dependent person is less able to recognize himself from blurred photographs than the analytic or field-independent person.

As for those who are able to identify themselves more easily and yet do exceedingly poor on a measure of level of differentiation such as the Embedded-figures Test, extreme narcissism may be the case and should not be confused with sophisticated articulation. At the other extreme, it may be just as possible for an analytic type to be perceptually defensive with regard to his appearance and consequently score extremely low on self-identification tests. Witkin has pointed out the fallacy in assuming that in every child integration has naturally kept pace with differentiation.

It was, therefore, hypothesized by the writer that a positive relationship may exist between the extent to which a child has learned to differentiate his own facial features and those of others and the extent to which he has learned to differentiate his environment in general. This is to say that he has learned a perceptual mode or style of articulating his environment that is characteristic of him. Furthermore, it was hypothesized that the stability, pervasiveness, and enduring quality of this perceptual style will impose itself not only on his response to non-social stimuli, but to social stimuli as well (Rudin & Stagner, 1958).

Purpose of the Research

The purpose of this study was to investigate the developmental level of perceptual differentiation of young children through the use of perceptual tasks involving social and non-social stimuli. It was felt that this could be satisfactorily accomplished through

the use of a rod and frame test and a self-other identifiaction task similar to the one used in the earlier study by the investigator.

It was hoped that such a study would be of particular interest to those involved in the process of teaching very young children. The variables considered were generally those of perception. The significance of a developmental study of children's perceptions can best be understood when one accepts the idea that the very foundation of all social behavior begins with perception (Combs and Snygg, 1959).

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

The purpose of this research was to explore the perceptual differentiation in young children through the use of two tasks. The first, a modified rod and frame test, employed successfully in the past as a measure of field dependence. The second, a self-other recognition test utilized photographs to estimate the extent to which a child had achieved articulation of his own face and the faces of others. Research has strongly supported the existence of perceptual modes or styles for individuals extending across various perceptual tasks. Therefore, in addition to investigating the level of differentiation in children, interest was also focused on the degree of association between the two tasks. The following review is the result of a survey of the literature for theory and research relevant to these problems.

The Development of the Concept of Field Dependence

The history of the term "field dependence" can be traced back to the early Witkin and Asch studies dealing with conformity (Witkin et al., 1962). It was during their investigation in this area with such measures as the Body Adjustment Test, Room Adjustment Test, and the Rod and Frame Test, that they discovered people

could be differentiated quite generally along a dimension of perceptual style reflecting what was later considered to be an "analytical" vs. "global" approach to life. Their interest in discovering the variables underlying this dimension led them to investigate three possible explanations. The first had to do with accuracy. This was the notion that the field-independent person was simply a more accurate judge than the field-dependent person. Further research in this area indicated the unlikelihood of this being the responsible agent. The next possible source investigated was that of body sensitivity. Again, as with the accuracy theory, the notion that field-independent people were more sensitive to body cues was not supported. The last hypothesis to be investigated in relation to the nature of field dependence revolved around the concept of one's ability to overcome an embedding context. Support for this theory was found in the strong relationship discovered between the before-mentioned perceptual tasks (Body Adjustment Test, Room Adjustment Test, and the Rod and Frame Test) and performance on the Embedded-figures Test (EFT). In analyzing the requirements of each test, this would seem to be a valid concept.

From this point, the research undertaken by Witkin and his co-workers (1962) proceeded in three definite directions. Generally speaking, the first area of investigation raised the question of self-consistency with regard to an individual's personality and his performance across various kinds of perceptual tasks requiring differentiation. The Thematic Apperception Test, Figure Drawing Test, Miniature-toy Play, and Rorschach were used to assess

personality. Perceptual style was estimated from performance on the Embedded-figures Test, the Tilting Room and Tilting Chair Test, and the Rod and Frame Test. The results strongly supported not only the hypothesis of a fundamental consistency of performance across various perceptual tasks, but also a significant degree of relationship between perceptual style and personality traits.

The relationship that has been found between Witkin's perceptual types and numerous variables has been exceedingly interesting to say the least. This fact is well illustrated in the summary of one chapter of Psychological Differentiation:

> The range and diversity of activities found to be related to mode of field approach in the course of these studies is particularly impressive. To illustrate, individuals with an analytical field approach, in contrast to people with a global approach, tend to be less dependent on the examiner in test situations for definition both of the task and their role in it; they are regarded by others as socially more independent; they show less interest in and need for people and a relatively intellectual and impersonal approach to problems; they are usually less influenced by authority, tending to be guided by values, standards, and needs of their own; they are apt to have a stable self-view; and they are less attentive to subtle social cues given by others...in general, their attitudes, feelings, and needs are developed and discrete and do not easily become fused with the matrix of attitudes, feelings, and needs of others (Witkin et al., 1962, pp. 155-6).

The second direction taken by the investigators was aimed at discovering the effect of early life experiences on the development of perceptual style. In this particular series of studies, special attention was given to the mother-child relationship. The hypothesis that the developmental level of differentiation achieved by the child would be related to the degree to which the interaction with the mother was conducive to this development was supported.

It was also found that well-differentiated children tend to have mothers who generally have clear, well-defined concepts of themselves and others (Witkin et al., 1962).

The third area of research dealt with the stability of individual patterns of functioning during development. A battery of field dependence and projective tests was administered to groups of children at various age levels. These longitudinal studies seemed to support at least two hypotheses. First, children generally become more differentiated as they grow older, that is, they proceed generally from a global approach of viewing the world to a more analytical approach. This should not, however, be thought of as a linear relationship. Both sexes generally taper off during late adolescence by either maintaining their present level of field dependence or by actually regressing to a more global approach to life. Not surprising is the fact that girls have been found to regress more frequently than boys. It would seem that this may be a cultural artifact promulgated by the initiation of a more obvious female dependency role at this time (Anastasi, 1958).

Witkin and his associates have found substantial support for a sex difference between the two perceptual types. In general, females tend to respond globally whereas males respond analytically. The earlier study performed on seventh graders by the writer, however, did not support this notion, which raises some questions as to the validity of this hypothesis, at least with respect to seventh graders.

The investigation of stability by Witkin further revealed that individuals tend to maintain their relative position with respect to each other despite the general trend of development from a global to a more analytic approach.

In conclusion there seems to be a significant amount of evidence for believing: 1. That self-consistency is generally maintained across perceptual tasks and within personality variables; 2. That early life experiences have a significant effect on the development of one's perceptual style; 3. And last, that the individual's patterns of perceptual functioning during development and throughout adulthood are relatively stable.

The Rod and Frame Test

The Rod and Frame Test has been used in conjunction with other perceptual tasks as a measure of field dependence. For this reason a number of related studies utilizing other means for measuring field dependence have been included.

In his early investigations into the relationship between personality and perceptual differences, Witkin (1959) administered a series of perceptual and projective tests to two groups of children. One group was tested intermittently from the time they were eight years old until they reached 13. The second group was tested from age 10 to 17. One of the perceptual tasks utilized as a measure of field dependence was the Rod and Frame Test. The methods employed for evaluating the child's personality development consisted of interviews and various projective tests (the Rorschach, Figure Drawing, Thematic Apperception Test, and miniature-toy play situations).

Witkin reported that the results of all the studies support the same general conclusion: Age and intelligence tend to be inversely related to field dependence, and boys are generally less field dependent than girls. A marked change toward field independence was noted in the 8 to 13 year period. Following this, the trend was to level off and, with some, to even regress. Of particular interest was the fact that even though the means changed within the groups, the individuals maintained their relative positions with respect to each other. As Witkin has pointed out, such findings suggest not only the possibility of the establishment of perceptual style occurring early in life, but that once established, it tends to remain relatively stable.

A positive relationship was also found between the tendency to remain field dependent and retarded progress in general psychological development. With regard to this finding, Witkin aptly expressed the opinion that, "Perceptual style does not by itself indicate whether a child will have a "healthy" personality; it may, however, suggest the form that pathological developments may take" (1959, p. 56).

Searching further for possible clues to the origin of field dependence, the mothers of a number of 10-year-old boys being used in the study were interviewed. On the basis of interviews, they were classified as "growth constricting" or "growth fostering." A significant relationship was found between this classification and the children's perceptual performance. Field-dependent children

tended to come from mothers classified as "growth constricting" and field-independent children, from mothers classified as "growth fostering."

These results have been further supported and discussed in Witkin's more recent publications (Witkin et al., 1962; Dyk and Witkin, 1965). Currently, he and his co-workers are completing research conducted with 72 children, in a six-to-nine-year period. Data on these children from an earlier infant study (Escalona et al., 1952) are being utilized by Witkin as a means of further investigating early environmental factors which may have significantly affected the development of perceptual style. The findings should be extremely interesting to those concerned with child development.

Crandall and Sinkeldam (1964) worked with 22 girls and 28 boys ranging in age from 6 years and 10 months to 12 years and 5 months in an attempt to test the following hypotheses:

Hypothesis One. Age and intelligence are negatively correlated with field dependence.

Hypothesis Two. Socially dependent children exhibit more perceptual dependence than children who are relatively less socially dependent.

Hypothesis Three. Children who are achievement oriented in social behaviors will be less field dependent than children who are relatively less achievement oriented.

The Embedded-figures Test was used as a measure of field dependence. The extent of a child's social dependence and achievement motivation were estimated from observational ratings during

free play. The social dependency ratings were based on the extent to which the child sought:

1. Instrumental help.
2. Recognition and approval.
3. Affection.
4. Recognition and approval from adults.

The achievement variables were:

1. Mastery of fine motor skills.
2. Task persistence.
3. Time spent alone on task.
4. Independent achievement efforts.

The researchers found, as expected, that older, more intelligent children did significantly better on the Embedded-figures Test. Although there was a trend for the boys to do better than the girls, the performances between the sexes was not significantly different. Of special interest is the fact that no relationship was found between social dependence and perceptual dependence in these children. Also of interest was the finding that the best predictor of a child's performance on the Embedded-figures Test was the achievement rating given to him by the trained observer.

Alexander and Gudeman (1965), concerned over the relationship between perceptual dependence and interpersonal dependence, compared four groups of alcoholics, one group of hospitalized psychiatric patients, and a group of normals on the Rod and Frame Test and three laboratory interpersonal tasks. Each group consisted of 10 males. Picture hanging, baby naming, and ambiguous

statements were used as tasks for determining the degree to which a subject was interpersonally dependent. In each of these three tasks, confederates were employed as the object to which the socially dependent subject could direct his need.

In only two of the six groups was the relationship between the two dimensions strong enough to be significant at the .01 level. Both groups had been previously classified as alcoholic. A positive correlation of .51 between the two dimensions, however, was significant beyond the .01 level for the total group (N=60). The researchers concluded that, at least for alcoholics, there exists a distinct positive relationship between perceptual and interpersonal dependence.

Konstadt[1] recently completed a study of field dependence involving young children. Dividing them into two groups, she gave them each the job of learning a simple clerical task. Both groups included an adult confederate. The confederate in the experimental group was very critical of the subjects' performance, whereas the control group confederate was instructed to be relatively passive. All of the children eventually learned the task, however, as expected, some learned faster than others. Of interest was the fact that though some children in the experimental group seemed obviously handicapped in their performance by the criticism of the confederate, others did as well or better than the control group of

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1 Personal communication from Dr. Norma Konstadt, Psychological Laboratory, Downstate Medical Center, Brooklyn, New York.

children despite this antagonism. Separating the most successful and least successful in this experimental group, she exposed them to a measurement of field dependence (EFT). Her findings clearly indicated that those who had successfully withstood the criticism were relatively less field dependent.

Pollack and Kiev (1963) did a follow-up study on subjects previously used by Betz at the Johns Hopkins Psychiatric Clinic. Betz (1963), in an investigation of personality differences between two groups of psychiatrists divided on the basis of their success with schizophrenics, discovered that the two groups could be differentiated independently by their performance on the Strong Vocational Interest Blank. The successful group scored high on the Lawyer Scale and the unsuccessful group, high on the Math-Physical Science Teacher Scale. Research with additional independent samples of resident physicians and schizophrenic patients further validated these findings. The follow-up study on 30 of the physicians by Pollack and Kiev found striking differences between the two groups in their ability to achieve spatial orientation in a situation utilizing Witkin's Dark Room Rod and Frame Test. The successful group was significantly more field dependent.

Morf (1963) tested 32 adults on the Rod and Frame Test. His results did not support the hypothesis of an inverse relationship between strength of reliance on internal and external frames of reference.

To investigate effects of training on field dependence, Elliot and McMichael (1963) used the Rod and Frame Test to screen 44 normal adults (21 males and 23 females). Fourteen of the group were found to be field dependent. Half of the field-dependent subjects then received instructions on how to resist the influence of the tilted frame and how to use bodily cues. The second half received, in addition to this, feedback and discussion.

The stability of the field dependence concept was supported in the findings of this study. Training did not improve the first group, and only momentarily improved the second. In fact the feedback group on a seven-week retest did worse. Also, no significant sex differences were found.

Karp (1963) hypothesized that Witkin's concept of field dependence involves the ability to resist distractions. To explore this idea he administered a battery of 18 tests to a group of 150 male college students. Included were measures of resistance to distraction and field dependence. In support of Witkin's hypothesis, a factor analysis indicated that the selected measure of field dependence loads and defines a different factor than the distraction test.

Elkind et al. (1963) tested 30 men and 26 women with Witkin's Embedded-figures Test and the Shipley Hartford Scale. Their findings indicated that field independence is an asset on tests that require the abstraction of elements and relations from things rather than words.

Identification of Self and Others from Photographs

In the area of individual differences, there has been relatively little research on the relationship of perceptual style and subject's ability to identify themselves and others from photographs. A number of researchers have employed photographs, but few have specifically used them as a perceptual task for purposes of identification. Dr. Werner Wolff's extensive utilization of photographs as a projective technique stands as one of the few exceptions. He describes the difficulty encountered by individuals in attempting to identify themselves:

> We see that there is, not withstanding the recognition, an attitude of resistance, caused by emotional tendencies which persist, even after the subjects have recognized themselves, in the form of an inner tension. One of the subjects expressed this state of tension correctly in saying, "I see myself differently from within than from without." This means that the subject, in a way, lives two lives: an inner life with which he alone identifies himself, . . . the life of his wish image; and an outer life, the merciless reality of which is now presented to him. This reality frightens the subject, and that is the reason he fails to recognize himself (Wolff, 1933b, p. 335).

Wolff has coined the term "wish-image" to refer to an ideal self or a self image which is more comfortable to live with, but may be wholly unrecognizable to others. Such a picture of one's self, as he explains below, can quite often become a handicap to the individual in his daily contact with reality:

> Every person has beside the apparent character known to his surroundings a hidden character, and it is precisely this which manifests itself in its forms of expression and can, in the first instance, be seized upon only by persons judging themselves. A man judging himself does not follow the view of his character apparent to strangers, but follows his wish image; and it is the latter which prevents him from recognizing the reality (Wolff, 1933a, pp. 171-172).

Wolff (1933b) has also studied recognition from photographs of the various parts of one's own body, such as the hands and feet. His findings suggest that individuals generally do not identify parts of their own body from photographs unless informed in advance as to the nature of the task (Ricker, 1950). In agreement with Witkin (1962), he concluded that whether or not an individual is able to recognize his own body or parts thereof may depend upon certain personality variables (Wolff, 1943).

The concept of body image seems to be particularly relevant at this point. Specifically, it refers to the largely visual memory image one has of his own body. Arnhoff and Damianopaulos (1964) devised a self-recognition task utilizing photographs of the semi-nude body of each subject. The task was to identify one's own body from a series of seven photos matched and graded on a continum of similarity-dissimilarity. Young normal adults earned a perfect score on accuracy. Only nine of the 24 schizophrenics were able to do as well.

Sampson et al. (1962) studied the recognition of self and others from photographs with and without the effects of chlorpromazine. The subjects used were 72 chronic, non-organic schizophrenic women, randomly selected from a population of a 3000-bed mental hospital. The range in age was from 28 to 53 years. Subjects were randomly assigned to chlorpromazine (51) and to placebo (21) for 10 weeks. During the ninth week of medication and again 40 weeks after medication had terminated, they were asked to identify themselves and others from individual 2-1/4 x 3-1/4 inch black and white

photographs. Each subject was given scores on (a) her ability to sort out those inmates in her ward, (b) her ability to name or identify the persons in the photographs, (c) her ability to recognize or identify herself, and (d) the extent to which others were able to identify her.

The results clearly indicated that: (1) chlorpromazine produces increased social awareness in chronic schizophrenic women, and (2) chlorpromazine produces a greater acceptance of self.

In discussing the results, the researchers were enthusiastic over the instrument for the following reasons:

> One of the chief values of the picture recognition technique, in addition to its simplicity of administration and quantifiable nature, is that the experience of seeing pictures of themselves and fellow patients evokes an unusual amount of interested participation on the part of these subjects. This heightened interest may make it possible, in the future work, to elicit value judgments, both positive and negative, as in standard sociometric procedures ....The fact that the procedure was a sensitive indicator of chlorpromazine effect in chronic schizophrenic women indicates that it is an appropriate and promising measurement deserving further development (p. 513).

Reiff (1962), working with subjects under observation for criminal offense (age range 19-49 years) attempted to identify manifestations of disturbances in body image associated with disturbances of selected ego functions that regulate thinking. Body image was measured by the Lerner Figure Drawing Scale; verbal and visual abstraction was measured by similarities and block design sub-tests of the Wechsler Adult Intelligence Scale; and regulation and control of primary process modes of thought was measured by the Holt Index of Primary Process Manifestations in

Rorschach responses. At least three findings were of general interest to this study:

1. A strong reality orientation of body image was associated with adaptive use of primary process and control (.01 level of significance).

2. The adaptive use and control of the primary process was associated with a strong total body image (.05 level of significance).

3. A strong reality relationship of body image was related to strength of verbal abstraction (.05 level of significance).

Good definition of one's self from the environment has further been identified with Witkin's concept of field dependence. Subjects having a well articulated body image have been generally less field dependent (Witkin et al., 1962).

Sieracki (1963), investigated the relationship between body image and acceptance of disability among 50 hospitalized white males. Half of the subjects had visible disabilities and the other half, non-visible. All subjects were permanently disabled and quite aware of their handicap. An estimate of the body image boundary was obtained from the Rorschach Barrier Scores. A sentence completion test and Grands Behavior Rating Scale were employed as measures of acceptance. The results showed a positive association between the Body Barrier Index and acceptance of disability. Those with a clearer, more well defined body image were more acceptant of themselves.

Bookbinder (1963) selected 48 subjects high in authoritarianism and 48 who were low. They rated themselves and others from photographs on 30 different personality variables using a nine-point

scale. The results suggested that persons scoring high on the authoritarian scale tend to perceive themselves as more submissive and friendly.

Wallach and Kogan (1964) are currently studying defensiveness in children as related to sensitivity to facial expressions. This study was begun in 1961 and should be in print shortly. Menkes (1964) found that the more defensive a subject tended to be, the more accurately he identified the stimulus when it was not threatening. It was suggested that the defensive process may be one of selective attention to non-threatening stimuli.

Brooks and Goldstein (1963), working with nursery and elementary children ranging in age from three to 14 years, utilized photographs for purposes of recognition. The children were first asked to identify upright photographs of their classmates. The following week, the photographs which the child had previously identified were presented upside-down and he was once again asked for their identification. Only the facial features were included in the photographs. The results clearly indicated that accuracy of perception of both upright and inverted faces increase with age.

Goldstein and Chance (1964), feeling that the subjects' age and face age had been confounded in the earlier research, undertook a study to determine the relationship between ease of discrimination and age of face. Three groups of unfamiliar children's pictures (kindergarten, third, and eighth grade) were presented to kindergarten, third, and eighth grade children. The subjects were instructed to select a critical face from among five "background"

faces of the same age. The results were in agreement with the findings of the earlier study in that the ability to recognize faces tended to improve with age. No significant relationship was found, however, between ease of discrimination and age of face.

Witkin, in discussing the separate studies of Bellar, Crutchfield, and DeVaris, concluded that "There thus appears to be characteristic patterns of perceiving others associated with contrasting modes of field approach." And of special significance to this study, "attention to one's own face need not necessarily indicate an articulated body concept" (Witkin et al., 1962).

Summary

The concept of field dependence grew out of early studies in conformity by Witkin and Asch. The strong relationship discovered between performance on the Rod and Frame Test and the Embedded Figure Test led Witkin and his co-workers to suspect as the significant underlying variable the ability to overcome an embedding context. For this reason, field-independent subjects are often described as "analytical" and field dependent subjects, as possessing a more "global" approach to life. In general Witkin found significant evidence of:

1. Self-consistency across perceptual task and within personality variables.

2. The importance of early life experiences upon the development of perceptual style.

3. The relatively stable nature of individual patterns of perceptual functioning during development and throughout adulthood.

His studies of perceptual differentiation in children and adults have supported relationships between field dependence and age, intelligence, sex, and early life experiences. It was not related, on the other hand, to pathology.

Crandall was able to successfully duplicate the Witkin results for age and intelligence; however, he found no relationship between social and perceptual dependence. Gudman, on the other hand, found a significant relationship between social and perceptual dependence with alcoholics. Crandall found that achievement motivation was a strong predictor of field independence. Similarly, Konstadt found field independence related to success in withstanding personal criticism. These two findings suggest that confidence in one's own ability due to past success may be a significant variable underlying this dimension.

Pollack found that field dependent pyschotherapists were more successful with schizophrenics. Morf failed to find the inverse relationship expected between reliance on internal and external frames of reference. Elliot found that training did not improve performance on the Rod and Frame Test, and Karp concluded that distraction was not a significant variable in field dependence. Elkind showed that field independence was an asset on tests requiring abstraction of elements and relations from things rather than from words.

Wolff using photographs as a projective technique, found most individuals resistant to recognizing themselves. Arnoff found schizophrenics have more difficulty recognizing themselves than do

normals, and Sampson, working also with schizophrenics, found by utilizing a picture recognition test that chlorpromazine reduced social inhibition. The significance of this study lies in the successful employment of photographs as a measuring device.

Reiff found a well defined body image was closely associated with a strong reality orientation and adaptive use and control of the primary process. Witkin has demonstrated a relationship between field dependence and articulation of body-image. Sieracki, in line with these findings, concluded from his research that good definition of body image was positively related to self-acceptance.

Bookbinder gave further support to the hypothesis that personality affects perception, and Menkes concluded that the defensive process may be one of selective attention to non-threatening sources of stimulation.

Goldstein, in two separate studies, clearly demonstrated that accuracy of perception of photographs increases with age. In the latter study, he found no relationship between ease of discrimination and the age of the face being discriminated.

CHAPTER III

DESIGN OF THE STUDY

Introduction

The purpose of this study was to explore the perceptual styles of young children on two perceptual tasks. It was felt that this exploration would be made more meaningful if the tasks involved both non-social and social stimuli. This would permit an investigation of the performance records obtained from the two perceptual tasks as well as an exploration of a possible relationship between performances on the two separate dimensions (social and non-social) being tapped by the tasks.

The study was designed to utilize an analysis of variance technique for testing significance of differences in task performance between the various groups. Product-moment correlations and t-tests were also employed.

Formal Statement of Hypotheses

The formal hypotheses used in examining the problem under investigation in this study are as follows:

Hypothesis One. No significant differences will be found between sexes with regard to task performance.

Hypothesis Two. No significant differences will be found between grade levels with regard to task performance.

Hypothesis Three. Scores on the SORT will be evenly distributed among the task variables for the total sample.

Hypothesis Four. Performance on the perceptual task involving social stimuli (Self-Other Recognition Test) will be unrelated to performance on the perceptual task involving non-social stimuli (Rod and Frame Test).

Definition of Terms and Variables

Field dependence: A term used by Witkin (1962) to describe the extent to which an individual is dependent upon his environment for his orientation.

The Modified Rod and Frame Test (MRFT): This is a modified Witkin Rod and Frame Test designed by the experimenter for adaptation to this particular research. Its function is essentially the same as that of Witkin's. Basically, it is a device used to determine the extent to which a subject is able to make a judgment about verticality under the influence of misleading environmental cues. Performance on this test has been used as a measure of field dependence (Appendix C).

MRFT, Pre-Trial Test (Pre-Trial): The purpose of this test was twofold; (a) to determine if the subject could qualify for the MRFT, essentially could and would he cooperate, and (b) whether he understands the concept of verticality? These questions were answered by allowing the child four attempts at straightening a toy flag pole slanted 27° from the vertical, first to the right and then to the left (Appendix B).

MRFT, Total score (MRFT total): Each subject was allowed eight attempts at judging when the rod was vertical. His MRFT total was the algebraic mean difference between his judgment of the vertical and the true vertical (Appendix E).

First half of the MRFT vs. the last half (1st 1/2 vs. 2nd 1/2): One question was whether subjects become more or less field dependent as they progressed through the trials. Consequently, the first four trials were compared with the last four (Appendix C).

MRFT, The small angle of the frame vs. the large angle (20° vs. 50°): The question was raised as to whether it was more difficult to achieve verticality with the frame tilted at one angle rather than another. To answer this question, the algebraic means achieved by subjects when the frame was at 20° were compared with those achieved at 50° (Appendix C).

MRFT, The rod on the same side as the frame vs. the rod on the opposite (Same side vs. opposite side): The question raised here was whether or not the starting position of the rod in relation to the frame made a significant difference in level of difficulty. In answer to this question, the scored averages achieved by subjects were compared with those when the rod originated from the opposing side (Appendix C).

MRFT, Both rod and frame on the right side vs. both on the left (Right vs. left): The question asked here was whether "rightedness" or "leftedness" was a factor to be considered in this research. A comparison of the average scores when the rod

and frame originated from the right was made with the scores from the left (Appendix C).

Self-Other Recognition Test (SORT): This instrument was designed by the experimenter as a measuring device for estimating the extent to which the subject had differentiated his own face and faces of known others. In this test the subject was asked to identify: two girl friends, two boy friends, himself, his teachers (female), and the experimenter (male) from individual 4 x 5 inch black and white photographs under 12 levels of difficulty (Appendix D).

SORT, Total score (SORT total): Individual photographs of seven different persons were presented to a subject for his identification. On each he received a score of from 12 to zero. His total score was the average of these seven scores (Appendix E).

SORT, Self score (Self): Of the seven photographs a subject was asked to identify, one was a picture of himself. His score for self recognition could be 12 to zero, depending upon the level of difficulty at which the identification was made (Appendix E).

SORT, Peers of the same sex (Peers same): Each subject was asked to identify two friends of his own sex, a task which permitted him a score of from 12 to zero for each attempt. His "peers same" score, then, was the average of these two (Appendix E).

SORT, Peers of the opposite sex (Peers opposite): Each subject was asked to identify two friends of the opposite sex, and scored from 12 to zero for each attempt. His "peers opposite" score, then was the average of these two (Appendix E).

SORT, Authority figure of the same sex (Author. same): Each subject was asked to identify one known authority figure of the same sex. Scores for this performance ranged from 12 to zero (Appendix E).

SORT, Authority figure of the opposite sex (Author. opposite): Each subject was asked to identify one known authority figure of the opposite sex. Scores for this performance ranged from 12 to zero (Appendix E).

SORT, Teacher (Teach.): Each subject was asked to identify his teacher from a photograph at various levels of difficulty. Scores for this performance ranged from 12 to zero (Appendix E).

SORT, Experimenter (Me): Each subject was asked to identify the experimenter from a photograph at various levels of difficulty. Scores for this task ranged from 12 to zero (Appendix E).

The Sample

The subjects used for this research were normal white children (N=76) between the ages of four and nine, selected on the bases of sex and grade level. The total group was taken from the 1965 summer enrollment at P. K. Yonge Laboratory School of the University of Florida. As five grade levels were being studied, the first level involved pre-schoolers, normally between four and five years old, who were attending school for the first time. The second level involved five to six year-old children who had only one year of kindergarten. The third level involved children who had completed the first grade, the fourth level, children who had

completed the second grade, and the fifth level, children who had completed the third grade. The control for sex was accomplished by equal distribution at each grade level (Appendix H).

TABLE 1

DESCRIPTION OF THE SAMPLE

Grade Level by Sex	Number	Mean Age
Kindergarten Females	8	4.97
Kindergarten Males	8	4.76
First Grade Females	6	6.15
First Grade Males	6	6.01
Second Grade Females	8	6.67
Second Grade Males	8	6.85
Third Grade Females	11	8.10
Third Grade Males	11	8.23
Fourth Grade Females	5	8.68
Fourth Grade Males	5	8.92
Total	76	6.91

Limitations of the Study

Before drawing any conclusions from the results of this study, the possible limitations of such a selected group should be considered. Two are obviously that these children are attending a laboratory school and doing so during the summer period. As enrollment at this age is due primarily to the desires of the parents, parent motivation may be of interest in our discussion of limitations. There are at least three reasons why parents may have enrolled their children in summer school:

1. Overly ambitious parents may be projecting their feelings on their children. Summer school offers one means of satisfying these needs.

2. The parents decide, for one reason or another, that the summer would be less frustrating with the children enrolled in school.

3. The parents on the advice of school officials have decided to enroll their children in the summer program.

It is quite likely that summer school may serve as a substitute for the more expensive camp or the trip to visit grandma. For example, it may be quite representative of the population, for a parent after spending nine months of child-free mornings to suddenly admit, "I wish I could find someone to take Johnny off my hands for only a little while," or "I think it would do Johnny good to go to camp etc." If this is the average parent, whether or not Johnny goes to grandma's, camp, or summer school seems irrelevant for purposes of this study. Our sample, therefore, despite its high selectivity may be quite representative of the normal population.

If on the other hand our group had been populated for reasons similar to that of number one or three, there would be little doubt of the limitations imposed on this study. Fortunately, from personal conferences with the teachres, this did not seem to be the case.

The Modified Rod and Frame Test

Description: The frame of the apparatus used in this test was a 14 x 18 inch picture frame. The width of the frame was 1-1/4 inches. It was mounted on a 14 x 18 inch piece of plywood. The frame itself was painted white and coated with luminous paint and the plywood backing was painted a flat black. The rod was made from a piece of wooden dowel measuring 5/8 of an inch in width and 10 inches long. On top of this dowel was glued a small nob to give the rod the appearance of a flag pole. From the top of the nob to the bottom of the rod measured 10-3/4 inches.

The miniature flag pole or rod was painted white and coated with luminous paint. Both were mounted on the same center and pivoted independently, the entire apparatus being supported by a heavy 25 x 25 inch plywood backing, also painted a flat black. This square backing served as one end of a plywood box measuring 5 feet in length and 25 to 26 inches on each side. At the opposite end a hole was cut through which the subject could observe the rod and frame. On the rod-frame end, the examiner could manually adjust the rod or frame to any angle to the vertical. By painting the inside of the box a flat black, only the rod and frame were visible to the subject when tested. It was assumed that under these conditions, the subject's orientation to the vertical would either have to come from the frame or the subject himself.

It was felt that the use of a toy flag pole rather than a rod would be much more meaningful to young children. A light was placed in the box and turned on between observations to energize

the luminous paint. The rod and frame were operated from the back by the examiner and the child scored according to the difference between what he felt to be the vertical and the true vertical. The outside of the box was painted black and decorated with attractive cartoon figures (Appendix C).

Procedure: The administration of the test was handled much as a game in order to maintain the child's interest. Following the child's transit from his room to the place of examination, the concept of verticality was discussed. Special attention was given to upright objects, such as telephone poles, etc. The fact that they did not lean to one side or the other such as some trees obviously did, was pointed out.

Before the test was begun, a number of practice trials were undertaken outside of the box to make sure the child fully understood what he was to do (Appendix B). This was accomplished through the use of a small model.* From this model he was asked to demonstrate his ability to make an adjustment to the vertical without the misleading influence of the frame. Following this, the light inside the MRFT was turned on and the child allowed to view the interior. The contents of the box were discussed in detail. Also at this point adjustments of both the rod and frame were made and agreement with the child was obtained as to when the rod was vertical.

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* The construction and inclusion of this small model as a pre-trial test for the concept of verticality was inspired through the helpful suggestions of Dr. Douglas E. Scates, Professor of Education, University of Florida.

The light inside the box was then turned out while the child continued to observe. The light was eliminated when the position of the frame was approximately 50° from true vertical and the rod was vertical. Agreement was again obtained from the child as to the position of the rod with respect to vertical.

He was then told that when the "little flag pole" was straight up and down as it was at this moment, just as the "little flag pole" he had previously played with, he was to say, "stop." Furthermore, he was to pay no attention to the picture frame because it would always be "crooked" or slanted, but to concentrate his attention on the "little flag pole" and say, "stop", when he thought it was straight up and down, just as he was standing or sitting, as the case may be.

At this point, it was felt that most children understood precisely what they were to do. In such cases where there was some doubt, more time and instruction were given. In most instances, however, this was not found to be necessary.

The children were then informed that the examiner was only able to move the pole but was quite unable to view this movement and it would be necessary, therefore, for the child to watch the positioning of the flag pole and signal when he felt the pole was straight. He was reminded a number of times that he was helping the examiner because the examiner could not see what he was doing. It was felt that in this way the child would feel involved in a partnership with the examiner in the common task of setting the

flag pole erect. Consequently, his motivation would produce a more valid response.

After the child had received his instructions and it appeared that he understood what he was to do, he was told that a small trap door would prevent him from viewing the rod and frame until such time as the examiner was ready to play the game. The examiner then dropped the flap and set the frame at a 50° tilt left of the vertical. The rod was positioned to a point 60° left of the vertical. Half of the trials were made in the direction with the frame and half away from the frame (Appendix C). The child was then asked if he was ready to begin. Following an affirmative answer, the light within the box was turned out and the small flap preventing the subject from viewing the rod and frame was lifted. The subject was asked to watch the "flag pole" carefully and indicate as instructed when he thought it was straight up and down. The examiner then very slowly began to rotate the flag pole to the upright position. Eight trials were conducted. The total score for the subject was the algebraic mean deviation in degrees of the subject's judged vertical from the true vertical, and was referred to as the MRFT total.

The Self Other Recognition Test

Description: Basically, this test asked individuals to identify four peers (two males and two females), a male and a female authority figure, and themselves, from photographs at various levels of field restriction. The construction of the test involved photographing the subjects to be identified. The children used in the

study were informally interviewed to determine the peers suitable for use in the test. Two boys and two girls were selected with whom the child appeared to be well acquainted.

The facial area and distance between facial features for each subject photographed was approximately the same on the negative in order that the print be adaptable for use with this test. In addition to this, the professional photographer who developed the negative and made the prints was instructed that the vertical distance from the eyes to the bottom of the chin should not be more than 1-5/8 inches. The error allowable in each case was an eighth of an inch on either side of this (Appendix D). Consequently, the faces of the children in all the photographs were, for all practical purposes, of the same size. Five x seven inch prints were made from these exposures. The test booklet used for obtaining the various levels of difficulty in recognition of the photographs was constructed from twelve 8-1/2 x 11 inch sheets of white paper. Approximately an inch above the center of each sheet of paper a circular hole was cut through which the face in the photograph could be viewed (Appendix D).

The first sheet had a section one-third the area of a circle (7/8" radius) removed, revealing just the eyes. The second, two-thirds, revealing the eyes and nose; and the third, the entire circle (7/8" radius), revealing the eyes, nose, and mouth. The successive pages each had a circular opening 1/8 of an inch larger than the preceding page. The last page was used as a back on which the photograph of the person to be identified was placed. These

sheets were so arranged that as the pages were turned, the area of the circular opening progressively became larger revealing more and more of the face in the photograph, and consequently, decreasing the level of difficulty as additional cues were revealed.

All of the testing sheets were then appropriately positioned in relation to each other and clamped together to form a testing booklet. Each page was decorated with a drawing of what might appear to be an old plank fence. In the middle of the fence was the circular hole through which the person in the photograph seemed to be looking (Appendix D).

Procedure: To administer the test, the examiner simply asked the child if he could identify the individual peering through the hole in the fence. As the child continued to show an unawareness of the person in the photograph, the researcher slowly turned the pages, allowing the child to see more and more of the person's face. The scores possible on this test ranged from 12, immediate recognition, to zero, for non-recognition (Appendix E).

By utilizing a portable measuring device of this type, it was possible to conduct the examination relatively close to the classroom.

What was hoped to be gained from such a test is in answer to the question concerning a child's developmental level of differentiation. Is the image of the teacher which the child carries around in his mind clearly defined or is it diffused and recognizable only by contour and size? How well has the child articulated the features of his various classmates? It was assumed that the

children who were able to identify their peers do so because for some reason they find it easier to clearly articulate their environment. Such an ability it would seem would require a higher level of differentiation. The explanation may be related to what the child has been accustomed to seeing. In a sense it was probably more than this, for we seemed to be exploring not only what but how these children had learned to perceive. In resolving these problems, attention was focused on any significant differences in perceptual performances which were associated with such variables as sex and grade level. Fundamentally, these were the questions to be explored by this study.

Pilot Study

A pilot study utilizing both perceptual tasks was initiated as an attempt at answering the following questions:

1. Will the tests differentiate children?

2. Do the performance scores made on the modified RFT appear to be congruent with the results Witkin has reported?

3. Are the procedures for administering the tests adequate for use with young children?

4. How much time should be allowed for administering the tests?

5. Are there other problems for which this experimenter has failed to account which may be discovered in a pilot study?

Generally speaking, the results of this small study were in agreement with the expectations of the experimenter. It was also anticipated that such a study would give the reseacher the

opportunity to practice various techniques of administering the two perceptual tests, but more important was the opportunity to develop a mode of behavior acceptable to small children. This truly seemed to be the greatest benefit received from the pilot study (Appendix F).

Collection of Data

The collection of data for this research was carried out in two stages. In stage one, the MRFT was administered individually to each of the participating subjects. Because of the simplicity of the test, its administration to a single child, generally, took less than ten minutes. Before administering the MRFT a single score was obtained from a pre-trial test used as a means of determining whether or not the child understood the concept of verticality (Appendix B).

The MRFT consisted of eight trials (Appendix C). From these trials the experimenter obtained the following scores:

1. Total mean score.
2. Mean score for the first half of the test.
3. Mean score for the last half of the test.
4. Mean score for performance when the frame was at a 20^{o} angle from vertical.
5. Mean score for performance when the frame was at a 50^{o} angle from vertical.
6. Mean score when the rod and frame both originated from the same side.

7. Mean score when the rod and frame both originated from opposite sides.

8. Mean score when the rod and frame both originated from the right hand side.

9. Mean score when the rod and frame both originated from the left hand side.

The second stage of data collection involved the individual administration of the SORT (Appendix D). As this test simply called for the spontaneous identification of only seven photographs, the individual testing period lasted less than five minutes. From this test a set of eight scores were obtained on each subject (Appendix E):

1. Total mean score.

2. Score for recognition of self.

3. Score for recognition of authority figure of the same sex.

4. Score for recognition of authority figure of the opposite sex.

5. Mean score for recognition of peers of the same sex.

6. Mean score for recognition of peers of the opposite sex.

7. Score for recognition of teacher.

8. Score for recognition of experimenter.

The descriptive data (age, sex, and grade level) were collected from the school records (Appendix H).

Procedure for Analysis of the Data

As previously stated in this proposal, the purpose of this research was to explore the associations between the three independent variables, sex, grade level, and age with the dependent variables, the two perceptual tasks. Of initial interest was whether significant performance differences might be found on either or both tasks that could be attributed to grade levels or sex. In answer to this question, the analysis of variance technique was employed as a method for the interpretation of group differences. Possible relationships between variables, and particularly between the two perceptual tasks, were investigated. This analysis was done with the assistance of the IBM 709 Computer. The 709 Computer was also employed for factor analyzing the data and for obtaining the means, standard deviations, and sum of squares of all the groups (by sex and grade level). This information was utilized in computing the F-tests and necessary t-tests.

A split-half correlation analysis was performed with the MRFT as an estimate of the reliability of the test. This was not possible, unfortunately, with the SORT.

CHAPTER IV

STATISTICAL ANALYSIS AND DISCUSSION OF THE RESULTS

Introduction

The purpose of this study was to investigate perceptual modes in young children through the use of two perceptual tasks. The tasks chosen were a modified Witkin's Rod and Frame Test (MRFT) and a self-other picture recognition test (SORT). The purpose and description of each task has been outlined in Chapter III. The analysis and discussion of results will be presented by this chapter in four parts.

Part one considers relationships between variables. The procedures followed occurred in three phases:

1. A factor analysis technique was utilized as an initial means for exploring possible relations and uncovering factors for analysis. The results obtained were helpful in suggesting needed areas of investigation.

2. The reliability of the tasks were next considered. Split-half reliability coefficients on the MRFT and intercorrelations of tasks variables were obtained.

3. The last phase involved an investigation of the correlations of all variables with the two perceptual tasks, first by total sample and then by sex. It was at this point that the question as to the relationship between perceptual modes was explored.

The second part of this chapter investigates differences in task performances associated with grade level and sex, and between selected task variables. The analysis of variance technique and the t-test (McNemar, 1963) were the two statistical means used. All tests of significance were two-tailed.

The third section of this chapter discussed the results in relation to the hypotheses, and the final section presents conclusions.

Correlation Analysis

Factor Analysis. Prior to any test of differences, the data (minus the 16 additional subjects added later) were intercorrelated and then factor analyzed as a way of determining areas for exploration. The results of intercorrelating the Pre-Trial Test, chronological age, and selected variables of the two tasks can be seen in Table 2. Only relationships at or beyond the .05 level of statistical significance were considered. The findings are listed below:

1. The "Pre-Trial" correlated significantly (.05) with "Peer same." The Pre-Trial was uncorrelated with other variables.

2. The MRFT variables were all interrelated, and all correlations were beyond the .01 level of significance.

3. The SORT variables, except for two, were moderately intercorrelated beyond the .01 level of significance. No correlation was found between "Self" and "Author. same." A small relationship between "Self" and "Peers same" was significant at the .05 level.

TABLE 2

INTERCORRELATIONS OF SELECTED SORT AND MRFT VARIABLES, MRFT PRE-TRIAL, AND AGE
(N = 60)

Variable		1	2	3	4	5	6	7	8	9	10	11
Pre-Trial	1	-	.03	-.05	-.03	-.03	-.03	-.25*	-.07	-.02	.02	-.07
First 1/2	2		-	.75***	.79***	.90***	-.16	.05	.06	-.16	-.11	-.29*
Second 1/2	3			-	.80***	.92***	-.28*	.12	.12	-.14	-.04	-.32**
20° angle	4				-	.71***	-.31**	-.02	-.04	-.18	-.13	-.26*
50° angle	5					-	-.21	.12	.14	-.15	-.06	-.34***
Self	6						-	.26*	.40***	.24	.36***	.28*
Peer same	7							-	.42***	.36***	.34***	.14
Peer opposite	8								-	.45***	.34***	.06
Author. same	9									-	.35***	.16
Author. opposite	10										-	.31**
C. Age	11											-

* $P \leq .05$.

** $P \leq .02$.

*** $P \leq .01$.

4. The MRFT variables, with two exceptions, were not correlated with the SORT variables. Two coefficients both having to do with "Self" were significant. The "Second 1/2" was correlated at the .05 level of significance and the "20° angle" at the .02 level.

5. Chronological age showed low correlations with all MRFT variables. The most significant correlation was between "50° angle" and age. The least significant (.05) relationships were between "First 1/2" and age, and "20° angle" and age. Age correlated low with "Self" and "Author. opposite" at a .05 and .02 level of significance. None of the other SORT variables correlated with age. Age did not correlate with the "Pre-Trial."

The factors and principle loadings in Table 3 are the result of a varimax rotation of the principle axis previously factored from the correlation matrix illustrated in Table 2 (Cattell, 1952; Fruchter, 1954).

TABLE 3

ROTATED FACTORS AND PRINCIPLE LOADINGS DERIVED FROM CORRELATIONS BETWEEN SELECTED SORT AND MRFT VARIABLES, MRFT PRE-TRIAL, AND AGE

Factor I Variable	F_1	Factor II Variable	F_2	Factor III Variable	F_3
First 1/2	.93	Peers same	.58	Self	.56
Second 1/2	.90	Peers opposite	.60	Author. opposite	.52
20^o angle	.83	Author. same	.56	C. Age	.52
50^o angle	.94				

An analysis of the factors indicated that:

1. All the MRFT variables loaded heavily on Factor I.

2. Factor II received its strongest contribution from three SORT variables. "Peers same," "Peers opposite," and "Author. same." No MRFT variables appeared in this factor.

3. Factor III received its heaviest loading from "Self," "Author. opposite," and age. None of the MRFT variables loaded this factor.

Task Reliability. The reliability of the MRFT was estimated by correlating the odd and even numbered trials. This meant that performances on trial one, three, five, and seven were correlated with those on trial two, four, six, and eight. Essentially, this was a split-half technique of arriving at a reliability coefficient. The Spearman-Brown correction formula was employed as a means of estimating the reliability of the total task, (Guilford, 1965). This method was employed for, a) the total sample, b) by sex, and c) by grade level. The results can be seen in Table 4.

TABLE 4

MRFT RELIABILITY USING SPLIT-HALF METHOD

Source	N	r_{hh}	Corrected Reliability Coeff. (r_{tt})
Total Group	76	.87	.93
Males	38	.85	.92
Females	38	.89	.94
Grade level I	16	.79	.88
Grade level II	12	.91	.95
Grade level III	16	.89	.94
Grade level IV	22	.85	.92
Grade level V	10	.73	.85

All correlations listed are statistically significant at or beyond the .01 level.

The results clearly show the MRFT to be a reasonably reliable test. The difference between the correlations (r_{hh}) for grade level II and V was not significant ($\bar{z}$ .1415).

Unfortunately, because of the low correlations between the SORT variables and basic organization of this task a similar reliability check was not possible. The two tasks were further explored, however, by intercorrelating for each task the variables in that task. The intercorrelations of the MRFT variables are listed below in Table 5.

TABLE 5

INTERCORRELATIONS OF MRFT VARIABLES
(N = 76)

Variables		1	2	3	4	5	6	7	8
First 1/2	1	-	.77	.81	.91	.90	.92	.93	.74
Second 1/2	2		-	.82	.93	.93	.91	.75	.96
20^{o} angle	3			-	.75	.85	.83	.80	.78
50^{o} angle	4				-	.95	.95	.86	.89
Same side	5					-	.89	.91	.93
Opposite side	6						-	.82	.82
Right	7							-	.71
Left	8								-

All correlations listed are statistically significant at or beyond the .01 level.

All of the MRFT variables were highly intercorrelated (.01 level of significance).

As can be seen from Table 6, the intercorrelations of the SORT variables did not present the same picture.

The correlations were generally low to moderate with only a few strong relationships indicated. Most were significant beyond the .01 level. The findings generally indicate that:

1. Of the 28 possible correlations between the SORT variables, 23 were statistically significant at the .01 level, two at the .02 level, and two at the .05 level. Only "Self" with "Author. same" was not significantly related.

TABLE 6

INTERCORRELATIONS OF SELECTED SORT VARIABLES, SORT TOTAL, AND AGE
(N = 60)

Variables		1	2	3	4	5	6	7	8	9
Self	1	-	.26*	.40***	.24	.36***	.61***	.34***	.29*	.28*
Peer same	2		-	.42***	.36***	.34***	.71***	.42***	.32**	.14
Peer opposite	3			-	.45***	.34***	.81***	.51***	.32**	.06
Author. same	4				-	.35***	.67***	.74***	.64***	.16
Author. opposite	5					-	.65***	.60***	.80***	.31**
SORT Total	6						-	.73***	.64***	.25
Teach.	7							-	.44**	.33***
Me	8								-	.18
C. Age	9									-

* $P \leq .05$

** $P \leq .02$

*** $P \leq .01$

2. Three SORT variables correlated with age. "Teach." correlated low at the .01 level; "Author. opposite," at the .02 level; and "Self," at the .05 level.

Cross Correlations: To explore the possible relationships between 1) tasks, 2) variables and tasks, and 3) performance and age, correlations were conducted across grade levels first for the total sample and then by sex. Table 7 illustrates the correlations for all variables with the two perceptual tasks.

The correlations across sex and grade level for the total sample indicated:

1. High correlations between the MRFT variables and the "MRFT total," were significant beyond the .01 level.

2. Moderately high correlations between the SORT variables and the "SORT total," were significant beyond the .01 level.

3. A moderate relationship between age and the "MRFT total," was significant beyond the .01 level. Age and "SORT total" were uncorrelated.

4. The MRFT variables did not correlate with the "SORT total," nor did any of the SORT variables correlate with the "MRFT total."

5. The "MRFT total" did not correlate with the "SORT total."

6. The "Pre-trial" was uncorrelated with the "MRFT total" and "SORT total."

TABLE 7

CROSS CORRELATIONS OF MRFT VARIABLES, MRFT PRE-TRIAL, SORT VARIABLES, MRFT TOTAL, SORT TOTAL, AND AGE WITH THE MRFT AND SORT TOTALS

	MRFT Total (N = 76)	SORT Total (N = 60)
Pre-Trial	N.S.	N.S.
MRFT Variables		
First 1/2	.93	N.S.
Second 1/2	.95	N.S.
20° angle	.87	N.S.
50° angle	.98	N.S.
Same side	.97	N.S.
Opposite side	.97	N.S.
Right	.89	N.S.
Left	.90	N.S.
MRFT Total	--	N.S.
SORT Variables		
Self	N.S.	.61
Peers same	N.S.	.71
Peers opposite	N.S.	.81
Author. same	N.S.	.67
Author. opposite	N.S.	.65
Teach.	N.S.	.73
Me	N.S.	.64
SORT Total	N.S.	--
C. Age	-.41	N.S.

All correlations listed are statistically significant at or beyond the .01 level.

The correlations across grade levels for male subjects can be seen in Table 8.

TABLE 8

CORRELATIONS OF MRFT VARIABLES, MRFT PRE-TRIAL, SORT VARIABLES, MRFT TOTAL, SORT TOTAL, AND AGE WITH MRFT AND SORT TOTALS FOR MALES

	MRFT Total (N = 38)	SORT Total (N = 30)
Pre-Trial	N.S.	N.S.
MRFT Variables		
First 1/2	.95**	N.S.
Second 1/2	.96**	N.S.
20° angle	.88**	-.36*
50° angle	.98**	N.S.
Same side	.97**	N.S.
Opposite side	.97**	N.S.
Right	.88**	N.S.
Left	.91**	N.S.
MRFT Total	--	N.S.
SORT Variables		
Self	N.S.	.70
Peers same	N.S.	.63
Peers opposite	N.S.	.84
Author. same	-.37*	.70
Author. opposite	-.36*	.78
Teach.	-.39*	.81
Me	-.35*	.69
SORT Total	N.S.	--
C. Age	-.41	N.S.

*$P \leq .05$.

**$P \leq .01$.

The correlations of variables with the "MRFT total" and "SORT total" for males indicate:

1. High correlations between the MRFT variables and the "MRFT total " were significant beyond the .01 level.

2. Moderately high correlations between the SORT variables and the "SORT total " were significant beyond the .01 level.

3. A moderate relationship between age and the "MRFT total" was significant beyond the .01 level. Age and "SORT total" were uncorrelated.

4. One MRFT variable, "20^{o} ," correlated low with the "SORT total" at a .05 level of significance. The remainder of the MRFT variables were uncorrelated with the "SORT total." Four SORT variables, "Author same," "Author opposite," "Teach," and "Me," correlated low with the "MRFT total" at a .05 level of significance.

5. The "MRFT total" did not correlate with the "SORT total."

6. The "Pre-trial" was uncorrelated with the "MRFT total" and the "SORT total."

The correlations across grade levels for female subjects can be seen in Table 9.

The correlations of variables with the "MRFT total" and "SORT total" for females indicate:

1. The "Pre-trial" correlated low with the "SORT total" at a .01 level of significance. It was uncorrelated with the "MRFT total."

2. High correlations between the MRFT variables and the "MRFT total " were significant beyond the .01 level.

TABLE 9

CORRELATIONS OF MRFT VARIABLES, MRFT PRE-TRIAL, SORT VARIABLES, MRFT TOTAL, SORT TOTAL, AND AGE WITH MRFT AND SORT TOTALS FOR FEMALES

	MRFT Total (N = 38)	SORT Total (N = 30)
Pre-Trial	N.S.	-.42
MRFT Variables		
First 1/2	.91	N.S.
Second 1/2	.93	N.S.
20° angle	.86	N.S.
50° angle	.98	N.S.
Same side	.97	N.S.
Opposite side	.97	N.S.
Right	.90	N.S.
Left	.89	N.S.
MRFT Total	1.00	N.S.
SORT Variables		
Self	N.S.	.59
Peers same	N.S.	.80
Peers opposite	N.S.	.71
Author. same	N.S.	.52
Author. opposite	N.S.	.64
Teach.	N.S.	.52
Me	N.S.	.64
SORT Total	N.S.	1.00
C. Age	-.43	N.S.

All correlations listed are significant at or beyond the .01 level.

3. Moderately high correlations between the SORT variables and the "SORT total," were significant beyond the .01 level.

4. A moderate relationship between age and the "MRFT total," was significant beyond the .01 level. Age and "SORT total" were uncorrelated.

5. The MRFT variables did not correlate with the "SORT total," nor did any of the SORT variables correlate with the "MRFT total."

6. The "MRFT total" did not correlate with the "SORT total."

Analysis of Differences

t-Test: Interest was aroused during the administration of the MRFT as to whether certain parts of the task may be significantly more difficult than others. For example, is it more difficult to make a judgment concerning verticality when the rod is slanted with the frame rather than against the frame? Differences can easily be seen between the means in Table 10; however, the question asked is whether these differences are significant. The t-test of significance was used to determine the probability of these differences occurring by chance.

The results of testing for significant differences between selected MRFT variables indicate:

1. Performance on the "First 1/2" was not significantly different from performance on the "Second 1/2" of the MRFT.

TABLE 10

MEANS, SD's AND t's FOR SELECTED VARIABLES OF THE MRFT
(N = 76)

Item	Mean	SD	t
First 1/2	15.50	9.64	1.15
Second 1/2	17.36	10.60	
20^{o} angle	13.63	5.75	3.17**
50^{o} angle	19.90	14.17	
Same side	18.26	9.90	2.36*
Opposite side	14.59	9.66	
Right	16.72	9.59	1.90
Left	19.98	11.86	

Two Tailed
* P $\leq$ .02
**P $\leq$ .01

2. It was significantly more difficult to achieve verticality with the frame at 50^{o} than at 20^{o}.

3. Making a judgment as to verticality was significantly more difficult when the rod originated from the same side as that of the frame than from the opposite.

4. The difference between performance with the rod and frame both on the right side as opposed to both being on the left was not significant.

It should be understood that negative correlations between the SORT and the MRFT actually represent a positive relationship. This is possible as the achievement of a high score on the MRFT requires a low value, whereas a high score on the SORT necessitates

a high value. With regard to this, a difference occurred between male and female task correlations with opposing tasks variables (Tables 8 and 9). Though most of the correlations are insignificant, they nevertheless differ in sign, with only one exception, depending on sex (Table 11). To test whether this difference was significant, the correlations were first converted to z-scores (Fisher z's) and then subjected to a t-test. The results can be seen below in Table 11.

TABLE 11

CORRELATION BETWEEN SELECTED SORT VARIABLES AND MRFT TOTAL BY SEX
(Male Ss = 30; Female Ss = 30)

Variable	Male r	50-(100 x z)	Female r	50-(100 x z)
Self	-.31	82	-.12	62
Peers same	.00	50	.14	36
Peers opposite	-.06	56	.25	24
Author. same	-.37	89	.04	46
Author. opposite	-.36	88	.29	20
Teach.	-.39	91	.04	46
Me	-.35	87	.29	20
	$\overline{z_m}$ = 77.57		$\overline{z_f}$ = 36.29	
	df = 6		t = 5.139*	

*$P \leq .01$.

The results clearly indicate that correlations for males between selected SORT variables and "MRFT total" are significantly different from correlations for females.

Analysis of Variance: The analysis of variance technique was used in this research to determine whether the differences in performance between groups were due merely to chance. This procedure was followed as a basis for accepting or rejecting three of the four main hypotheses. The first four analyses were of the "double classification with more than one score per cell" type (McNemar, 1963, pp. 303-305). The last analysis was of the "single classification with equal entries per column" type (McNemar, 1963, pp. 265-267).

One of the questions asked by this research was whether or not there were differences in performance on the MRFT which could be attributed to sex and grade level. Table 12 lists the means and standard deviations of MRFT scores by sex and grade level for the total sample.

In every case the means of the males are lower than those of the females, and in almost every case performance increases with an advancement in grade level. The plotted means in Figure 1 illustrate this.

TABLE 12

MEANS AND SD's OF MRFT TOTAL BY SEX AND GRADE LEVEL

Grade Level	Sex	N	Means	SD
I	Male	8	18.28	10.91
	Female	8	23.92	6.72
II	Male	6	15.58	5.56
	Female	6	17.00	9.09
III	Male	8	16.33	9.80
	Female	8	23.47	4.63
IV	Male	11	10.17	7.07
	Female	11	14.29	8.56
V	Male	5	6.79	1.21
	Female	5	10.86	6.64

The question investigated by this analysis of variance was: are differences among grade levels and sexes significant and is there a significant interaction between these two categories (Table 13).

TABLE 13

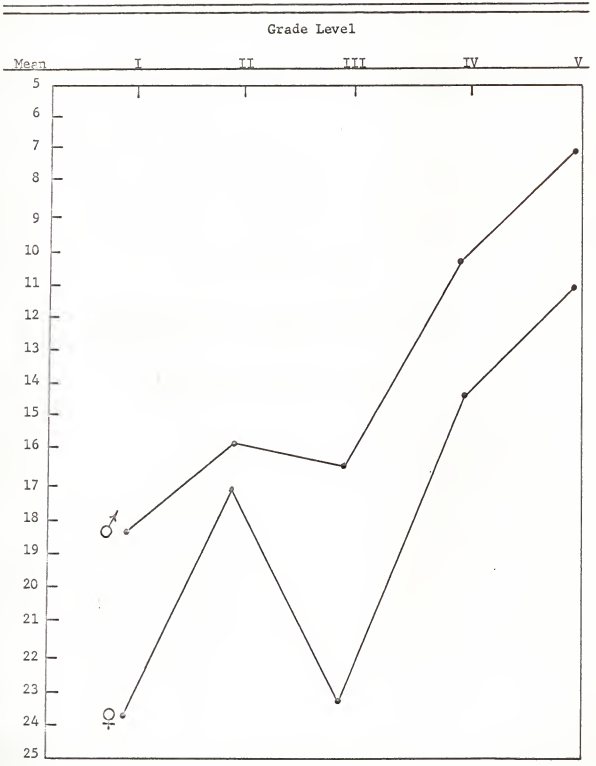
MRFT TOTAL ANALYSIS OF VARIANCE
(N = 76)

Source	Sum of Square	df	Variance Est.	F
Between Cells	1960.15	9		
Sex (Rows)	410.17	1	410.17	5.99*
Grade level (Columns)	1487.61	4	317.90	5.43**
Interaction	62.37	4	15.59	N.S.
Within Cells	4516.75	66	68.44	
Total	6476.80	75		

* $P \leq .05$
** $P \leq .001$

Figure 1

GRAPHED MEANS OF MRFT TOTAL BY SEX AND GRADE LEVEL



The results of the analysis of variance on the "MRFT total" data indicate:

1. Boys performed significantly (.05) better than girls on the MRFT.

2. There was a significant (.001) improvement for both sexes with increase in grade level.

3. There was no significant interaction.

An analysis of variance was not performed on Factor I for three reasons. First, all the MRFT variables were highly intercorrelated. Second, all the variables supporting Factor I could be found in the "MRFT total," and third, the technique had already been used with the "MRFT total"; consequently, no new information would be gained.

Such was not the case for the SORT, however. The intercorrelations between the SORT variables, though significant, were generally low. The "SORT total" by itself was, therefore, viewed as a poor measure for comparison. Consequently, the two SORT factors previously derived from factor analysis of the MRFT-SORT intercorrelations were included in the analysis of variance study.

Table 14 shows the means and standard deviations for the total sample of "SORT totals" by sex and grade level.

TABLE 14

MEANS AND SD's OF SORT TOTAL BY SEX AND GRADE LEVEL

Grade Level	Sex	N	Means	SD
I	Male	8	7.01	3.03
	Female	8	9.12	1.74
II	Male	6	8.48	.79
	Female	6	8.69	.97
III	Male	8	8.18	1.11
	Female	8	8.71	1.58
IV	Male	6	8.55	1.13
	Female	6	9.26	1.05

A survey of the above table indicates a possible sex difference in performance as do the plotted means in Figure 2.

Figure 2 also illustrates a possible developmental difference for the males only. The analysis of variance of this item, however, did not indicate a significant difference among the grade levels (Table 15).

TABLE 15

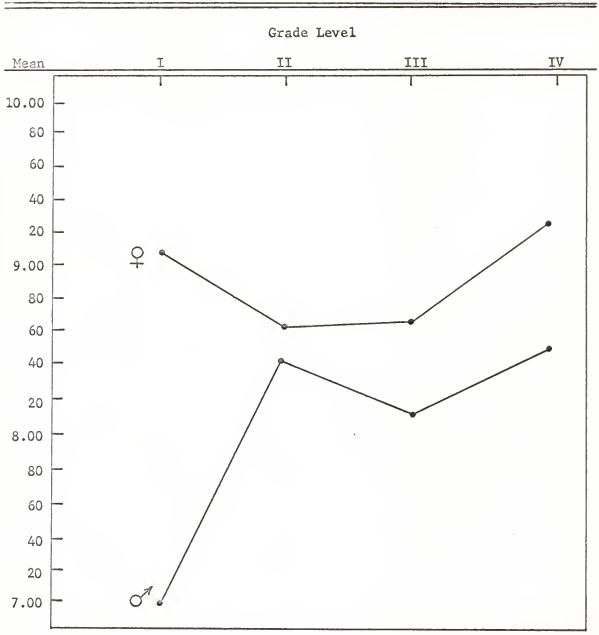
SORT TOTAL ANALYSIS OF VARIANCE
(N = 60)

Source	Sum of Squares	df	Variance Est.	F
Between Cells	26.75	7		
Sex (Rows)	13.05	1	13.05	4.35*
Grade level (Columns)	5.69	3	1.90	N.S.
Interaction	8.01	3	2.65	N.S.
Within Cells	156.20	52	3.00	
Total	182.95	59		

*$P \leq .05$.

Figure 2

GRAPHED MEANS OF SORT TOTAL BY SEX AND GRADE LEVEL



The performance difference between the sexes was significant beyond the .05 level, that is, girls on the average surpassed the boys at this task.

The means and SD's of Factor II are listed in Table 16. Factor II was composed of "Peers same," "Peers opposite," and "Author. same." The scores for the three variables were totaled and averaged as representative of Factor II.

TABLE 16

MEANS AND SD's OF FACTOR II BY SEX AND GRADE LEVEL

Grade Level	Sex	N	Means	SD
I	Male	8	7.06	3.34
	Female	8	9.75	3.00
II	Male	6	8.61	2.60
	Female	6	8.95	1.61
III	Male	8	8.06	2.12
	Female	8	8.92	1.81
IV	Male	8	7.83	2.53
	Female	8	9.54	1.52

A survey of the means in Table 16 shows a consistent difference between the sexes. Figure 3 graphically portrays this difference. It also illustrates what may be an interaction between sex and grade level.

The results of the analysis of variance indicate that the only significant difference was between the sexes. Female performance for Factor II surpassed male performance (Table 17).

Figure 3

GRAPHED MEANS OF FACTOR II BY SEX AND GRADE LEVEL

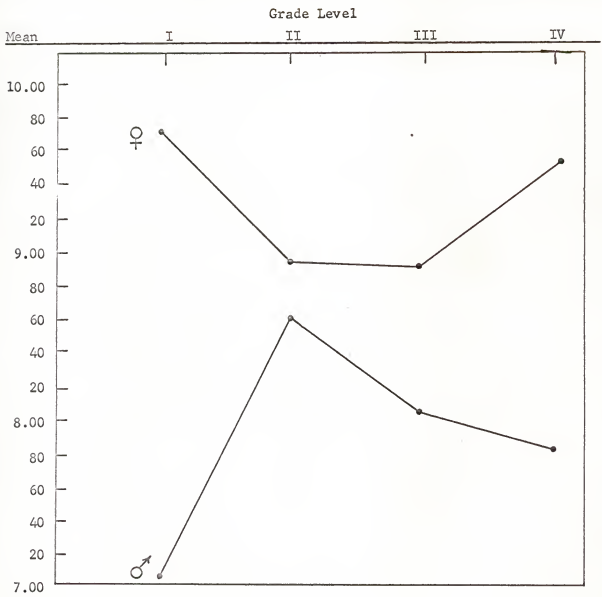


TABLE 17

FACTOR II ANALYSIS OF VARIANCE
(N = 60)

Source	Sum of Squares	df	Variance Est.	F
Between Cells	45.02	7		
Sex (Rows)	32.27	1	32.27	5.42*
Grade level (Columns)	1.35	3	.45	N.S.
Interaction	11.40	3	3.80	N.S.
Within Cells	209.18	52	5.95	
Total	254.20	59		

*$P \leq .05$.

The findings from Table 17 indicated no significant interaction between categories, or differences in performance among grade levels.

Factor III was supported by "Self," "Author. opposite," and age. The procedures for analysis were similar to those used with Factor II. The means and standard deviations of Factor III are listed in Table 18.

TABLE 18

MEANS AND SD'S OF FACTOR III BY SEX AND GRADE LEVEL

Grade Level	Sex	N	Mean	SD
I	Male	8	7.06	4.34
	Female	8	7.63	3.46
II	Male	6	9.13	1.64
	Female	6	8.33	1.84
III	Male	8	8.75	1.98
	Female	8	8.31	2.31
IV	Male	8	10.19	.95
	Female	8	8.33	3.59

Table 18 shows that males surpassed females on recognition of this factor. Figure 4 also illustrates this possible sex difference. There also seems to be a developmental trend at least for males (Figure 4).

The analysis of variance, however, failed to support these differences among grade levels and sexes as being significant, nor did it give any indication of a significant interaction (Table 19).

TABLE 19

FACTOR III ANALYSIS OF VARIANCE
(N = 60)

Source	Sum of Squares	df	Variance Est.	F
Between Cells	48.69	7		
Sex (Rows)	5.65	1	5.65	N.S.
Grade level (Columns)	31.03	3	10.34	N.S.
Interaction	12.01	3	4.00	N.S.
Within Cells	467.53	52	9.99	
Total	516.22	59		

The familiarity children have with their own faces and the ease with which they are able to recognize themselves has been of great interest to those working in the field of child psychology. For this reason the "Self" scores were subjected to an analysis of variance to determine if the differences among sexes and grade levels (see Table 20 and Figure 5) were significant.

Figure 4

GRAPHED MEANS OF FACTOR III BY SEX AND GRADE LEVEL

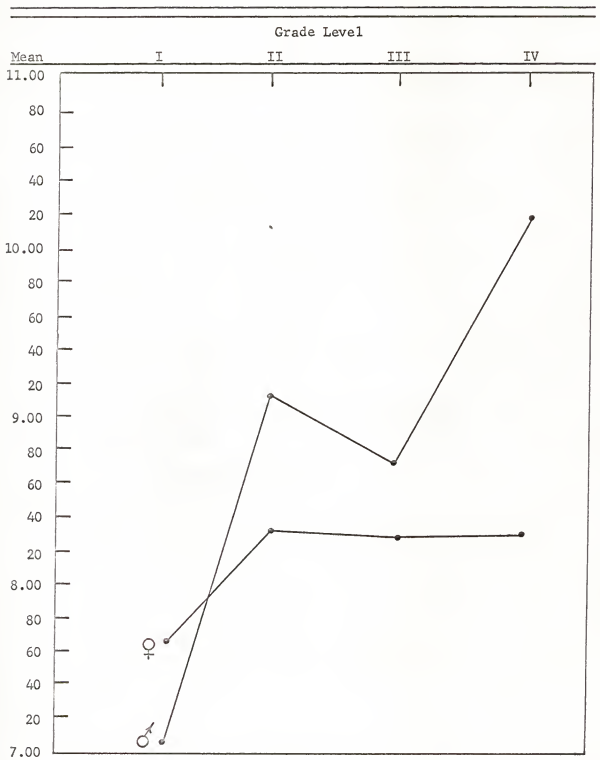


Figure 5

GRAPHED MEANS OF SELF VARIABLE BY SEX AND GRADE LEVEL

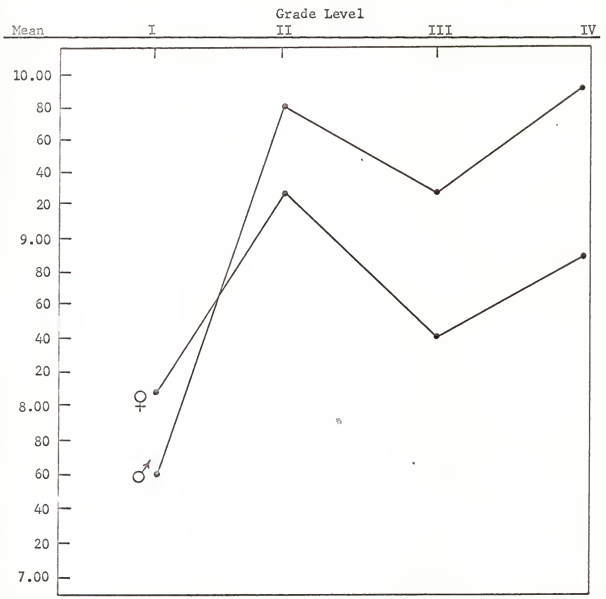


TABLE 20

MEANS AND SD's OF SELF VARIABLE BY SEX AND GRADE LEVEL

Grade Level	Sex	N	Mean	SD
I	Male	8	7.63	4.66
	Female	8	8.13	3.18
II	Male	6	9.83	1.07
	Female	6	9.33	1.49
III	Male	8	9.38	1.87
	Female	8	8.50	2.18
IV	Male	8	10.0	1.12
	Female	8	9.00	3.08

Figure 5 shows a possible trend toward more familiarity with one's own face as the grade level increases. The results of the analysis of variance of this variable can be found in Table 21.

TABLE 21

SELF VARIABLE ANALYSIS OF VARIANCE
(N = 60)

Source	Sum of Squares	df	Variance Est.	F
Between Cells	36.95	7		
Sex (Rows)	3.27	1	3.27	N.S.
Grade Level (Columns)	28.12	3	9.38	N.S.
Interaction	5.55	3	1.85	N.S.
Within Cells	426.79	52	8.21	
Total	463.74	59		

The findings from Table 21 indicate no significant differences among sample variables.

The final area of study employing the analysis of variance technique dealt with the distribution of scores on the SORT. Table 22 shows the total means and standard deviations for each of the seven variables.

TABLE 22

TOTAL MEANS AND SD's OF SELECTED SORT VARIABLES
(N = 60)

Variable	Mean	SD
Teach.	9.95	2.49
Self	8.93	2.78
Peers same	8.68	1.94
Author. same	8.53	2.74
Peers opposite	8.37	2.45
Author. opposite	8.03	2.80
Me	7.61	2.90

From examining the means, one might suspect that the differences between the variables were significant. The plotted means in Figure 6 further point this up.

Figure 6 shows the teacher as being the most easily recognized, "Self" next, then peers and authority figures, and finally "me."

For the differences between the variables to be significant at the .05 level, F had to be at least as large as 2.09. The calculated F was 2.03 (Table 23).

Figure 6

TOTAL DISTRIBUTION OF SORT SCORES BY VARIABLES
(N = 60)

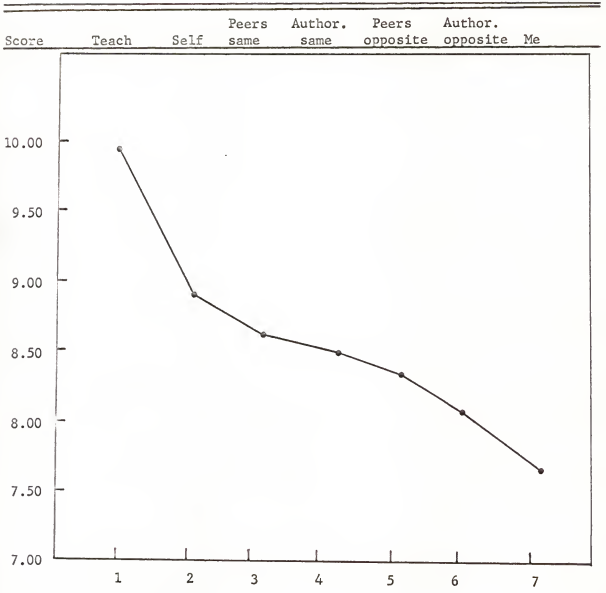


TABLE 23

ANALYSIS OF VARIANCE SEVEN SORT VARIABLES
(N = 420)

Source	Sum of Squares	df	Variance Est.	F
Between	85.12	6	14.19	N.S.
Within	2847.19	413	6.99	
Total	2932.31	419		

Discussion

First Hypothesis: The first hypothesis set forth by this study stated, "No significant differences will be found between sexes with regard to tasks performances." In reviewing the findings of this study, differences were discovered between sexes on both tasks. Males performed better on the MRFT and females performed better on the SORT. The analysis of variance indicated that these differences were significant. Consequently, the null hypothesis was rejected

Second Hypothesis: The second hypothesis of this study stated, "No significant differences will be found between grade levels with regard to tasks performance." The trend in MRFT means definitely leads one to suspect a significant difference between grade levels (Figure 1); however, the mean trends for the various SORT variables and factors are not so easily interpretable. There seems to be a developmental trend at least for males (see Figures 2 and 4), and in one instance for both sexes (see Figure 5),

however, Factor II (Figure 3) fails to support grade level difference for either sex. The analysis of variance of the "MRFT total" indicated that the observed differences between grade level performance on the MRFT were significant, that is, high grade levels performed significantly better on the MRFT than lower grade levels. Performance differences between grade levels were not found to be significant for any of the SORT variables or factors. As grade level differences were significant for one task but not for the other, this hypothesis could be rejected only in part.

Third Hypothesis: The third hypothesis assumed that SORT scores would be evenly distributed among the task variables for the total sample. That is, there would be no significant differences in the distribution of scores between the SORT variables. A simple analysis of variance was computed on seven SORT variables. The null was accepted.

Fourth Hypothesis: The fourth hypothesis stated that performance on the two perceptual tasks (SORT and MRFT) would be unrelated. This, essentially, required a correlation analysis. The results of the first analysis (see Table 2) found the MRFT variables with only two exceptions, uncorrelated with the SORT variables. Both exceptions were low relationships, significant at the .05 and .02 levels. In the cross-correlation analysis, no significant relationship appeared between tasks for females or for the total sample of males and females combined. For the male subjects, however, there was one low correlation between an MRFT variable and the "SORT total" and four similarly low correlations between SORT variables and the "MRFT total." All of the above mentioned correlations

were positive relationships significant at a .05 level. In none of the analysis was a relationship found between the "SORT total" and the "MRFT total." The hypothesis, therefore, may be rejected only with certain limitations. For the most part the two tasks do not appear to be significantly related; however, there was a small but significant tendency for boys who performed well on the MRFT to also perform well on selected parts of the SORT. Consequently, it may be stated that under limited conditions, the null hypothesis can be rejected.

Conclusions

The primary aim of this study has been the investigation of perceptual differentation in young children. The impetus for the study came from the reported research on field dependence by Herman Witkin and others. Field dependence has been defined earlier as the ability to overcome the influence of the field. Logically, the more dependent a person is upon his environment, the more influence it will have on him, and, consequently, the less autonomous will be his behavior. Witkin has warned, however, not to view field dependence as a cause of pathology but rather as a clue to the form it may take. Therefore, field dependence, by itself, is neither good nor bad. Its value would seem to depend upon the perceptual task faced by the individual. This study has focused on the relationship of field dependence to another perceptual task.

Before any relationship could be tested, an acceptable measure of field dependence had to be selected. As Witkin utilized the Rod and Frame Test (RFT) as his primary measure of field dependence, it was decided that the study must use the RFT or something similar if field dependence was to be a variable. A Modified Rod and Frame Test (MRFT) was constructed for use with small children. The big question was whether it could be considered a valid instrument. Logically, the next step was a comparison of the MRFT and RFT results. Witkin had found a sex difference in performance (males performed more adequately than females) and a positive relationship with age. Consequently, these were the two findings hoped for by this study. In this study, age was significantly related to the MRFT. A trend in performance by grade level was clearly illustrated in the graph of plotted means (Figure 1). The significance of this trend (.001) was demonstrated by an analysis of variance (Table 13).

The fact that the MRFT differentiated subjects as to their ability to resist the frame (see Appendix H) was evident. The question was whether resistance to the MRFT frame meant the same thing as resistance to Witkin's RFT frame. As one of the two obvious RFT attributes was duplicated by the MRFT, the answer in part was affirmative.

The other critical RFT attribute discovered was its ability to differentiate between sexes. Witkin found that generally male subjects performed more adequately on the RFT than most females.

This difference was also found in this study (Figure 1). The analysis of variance found the differences between the sexes to be significant at the .05 level. Thus, the second significant attribute of the RFT was met by the MRFT. Consequently, for all practical purposes, the validity of this instrument as a measurement of field dependence ceased to be a concern of the investigator.

Having established the MRFT as a reliable (see Figure 2) and valid measurement of field dependence, any correlated or uncorrelated findings between the MRFT and other tasks presumably could be taken as relations between those tasks and field dependence. Witkin and others had hypothesized that the ability to recognize self and others from photographs was inversely related to field dependence. This study therefore examined the relationship between the SORT and the MRFT. The correlation analysis (Tables 2, 7 and 9) gave little evidence of any relationship between the two tasks. Few significant correlations were found (Table 8). These relationships represented low positive correlations for male subjects only between a few of the SORT variables and the "MRFT total."

Generally, the findings of this study would seem to indicate that:

1. In using the MRFT, some combinations of the rod and frame are more difficult than others for subjects (Table 10).

2. Subjects do not become significantly more field dependent during their MRFT experience (Table 10).

3. The MRFT is a suitable measuring device for estimating the extent of field dependence in young children.

4. The SORT was fairly reliable and proved to be exceedingly helpful in estimating the extent to which a child had differentiated the facial features of himself and others.

5. The means for the SORT variables generally ranged from a 7.06 to a 10.19, with an average mean lying between 8.00 and 9.00 (see Tables 14, 16, 18, 20,and 22). As recognition at any of these points is limited solely to eye, nose, and mouth cues (see Appendix D) it would seem that children at this age are generally quite sophisticated in their articulation of facial features. Furthermore, the assumption that they are dependent upon hair style, shape or contour of face, dress, or ears in order to recognize a friend is totally unsupported by this study. The picture they have in their mind of their own face and those of known others is generally very well differentiated.

6. The variance in ability to recognize one's self and others from photographs is much greater within grade levels than between. Generally speaking, young children perform about as well on this task as the older ones. It would seem, therefore, that a high level of ability to recognize facial features may have been attained at an earlier age.

7. A child tends to recognize himself and familiar others about equally well. A subject's ability to differentiate facial features would seem, therefore, to be a pervasive characteristic of his perceptual style.

8. There is no general relationship between field dependence and ability to recognize self and known others from photographs.

9. A small but significant positive relationship between task variables for males only would seem to indicate that their ability to differentiate their physical environment may be related to their ability to define their social environment.

CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Summary

The purpose of this research was the investigation of perceptual modes in young children. Its impetus came from studies conducted by Witkin and his colleagues dealing with field dependence and its relation to other variables. The term field dependence refers to the extent to which an individual is dependent upon a context in which a figure is embedded while making a spatial judgement about the figure. The most acceptable measure of field dependence has been the Witkin Rod and Frame Test.

Witkin and others have discovered field dependence to be linked to age, sex, and personality differences. As a perceptual style, its definition has become a manner of perceiving one's environment. Consequently, as an enduring, pervasive trait underlying behavior, it has been considered as a possible influence in all perceptual tasks. Witkin hypothesized that social dependence was related to field dependence and that socially dependent subjects of necessity would excell at identifying themselves and others from photographs. This above average ability to identify people from photographs, it would seem, would require of the subject a higher than average level of differentiation. Witkin argues, however, that such an ability in field-dependent persons is largely superficial.

Conclusions on the subject were difficult due to the limited research dealing specifically with this problem. It might be argued that a person who has learned to articulate his environment to a fine degree would not stop with his physical world, but that this ability would manifest itself just as readily in his social perceptions. In support of this notion, an earlier study by the writer showed a significant positive relationship between performance on an Embedded-figures Test and ability to recognize one's self and others from slides projected at various levels of focus. Thus, the question was raised as to the relationship between field dependence and level of differentiation of one's social environment.

The lack of research specifically related to this problem with young children pointed up the necessity for this study. Its exploration required a suitable measure of field dependence. As Witkin had successfully employed the Rod and Frame Test for this purpose, it was felt that either this or something similar should be used. The Modified Rod and Frame Test was chosen for its suitability to young children. Results obtained by the MRFT were comparable to those found by Witkin with his RFT. The modified perceptual task, therefore, was felt to be a valid measure of field dependence. Reliability coefficients were all uniformly high.

The other perceptual task to which field dependence had been associated involved the recognition of one's own face and the face of known others from photographs. A Self-Other Recognition Test (SORT) was designed for this purpose. It, too, was found to be a fairly reliable and valid test. No significant differences

were found between the distribution of scores on any of the photographs used in the task.

The sample was composed of 38 boys and 38 girls from the 1965 summer enrollment at the P. K. Yonge Laboratory School of the University of Florida. Five grade levels were studied, beginning with kindergarten and extending through the fourth grade. The kindergarten children may be considered pre-schoolers as this was the first school experience they had encountered.

The statistical procedures utilized in analyzing the data included correlation analysis, factor analysis, t-test, and simple and complex analysis of variance. All tests of significance were two-tailed. Of the four null hypothesis set fourth by this research, only one could be completely rejected. Two others were rejected only in part, and a fourth, not at all. The findings relative to the hypotheses were:

1. Males performed significantly better on the MRFT; females performed significantly better on the SORT.

2. A positive relationship was found between age and the MRFT. Performance on the MRFT differed significantly with grade levels.

3. Low correlations were found among a small number of SORT variables and age. No significant differences in SORT performance were found between grade levels.

4. The SORT scores were equally distributed across SORT variables.

5. Only the male performances gave any indication of a relationship between the two perceptual tasks. These were small positive relationships (negative correlations) between a few SORT variables and the "MRFT total."

Conclusions

The conclusions drawn from the statistical findings should be limited to populations similar to that of the sample used in this study. In general, the findings suggest that:

1. In using the MRFT, some combinations of the rod and frame are more difficult than others.

2. Subjects do not become significantly more field dependent while taking the MRFT.

3. The MRFT is a suitable measure for estimating field dependence in young children.

4. The SORT was fairly stable, and proved to be useful in estimating the extent to which a child had differentiated the facial features of himself and others.

5. The means for the SORT variables generally ranged from a 7.06 to a 10.19, with an average mean lying between 8.00 and 9.00 (see Tables 14, 16, 18, 20, and 22). As recognition at any of these points is limited solely to eye, nose, and mouth cues (see Appendix D), it would seem that children at this age are generally quite sophisticated in their articulation of facial features. Furthermore, the concept that they are dependent upon hair style, shape or contour of face, dress, or ears in order to recognize a friend

is totally unsupported by this study. The picture they have in their mind of their own face and those of known others is generally very well differentiated.

6. The variance in ability to recognize one's self and others from photographs is much greater within grade levels than between. Generally speaking, young children perform about as well on this task as the older ones. It would seem, therefore, that a high level ability to recognize facial features may have been attained at an earlier age.

7. A child tends to recognize himself and familiar others about equally well. A subject's ability to differentiate facial features would seem, therefore, to be a pervasive characteristic of his perceptual style.

8. There is no general relationship between field dependence and ability to recognize oneself and known others from photographs.

9. A small but significant positive relationship between tasks variables for the males only would seem to indicate that the extent to which they differentiate their physical environment may in general be the degree to which they define their social environment.

Implications

The Witkin Rod and Frame Test used for measuring field dependence was of a standard size and dimension. The fact that comparable results were obtained by a smaller device, a frame which was rectangular rather than square, and a different combination of

rod and frame angles, makes one wonder what features of the RFT are critical.

Probably the critical aspect about the test was its principle of operation and in this the MRFT and RFT were identical. Both tasks basically asked the subject to do the same thing: differentiate himself from his environment in order to make a spatial judgement concerning some figure in that environment in relation to himself.

It would seem that this idea could be utilized in a number of different ways, each enriching our understanding of field dependence to a greater degree than before. The success of the MRFT is supporting evidence for such a plan. As shown by this research, different rod and frame combinations offer different levels of difficulty for the subject. Information of this nature may be helpful in constructing a more effective instrument.

Another line of research suggested by this study concerns the developmental onset of discrimination of facial features. Apparently, this study did not extend far enough downward in age to make any statement in this regard.

Research of a longitudinal nature is also suggested by this study. Follow-up studies with the same children would be valuable.

Insignificant trends and differences may prove to be highly significant.

Witkin's hypothesis of a relationship between field dependence and recognition of others was only weakly supported by male performance. Not only was the correlation low, but in the opposite

direction from that proposed by Witkin. Obviously, such findings do not mean Witkin was incorrect in his hypothesis; however, they do raise concern as to its validity for young children.

Obviously, then, the greatest contribution of this study is the question it has raised concerning the generality of a perceptual theory.

APPENDICES

A Through H

APPENDIX A

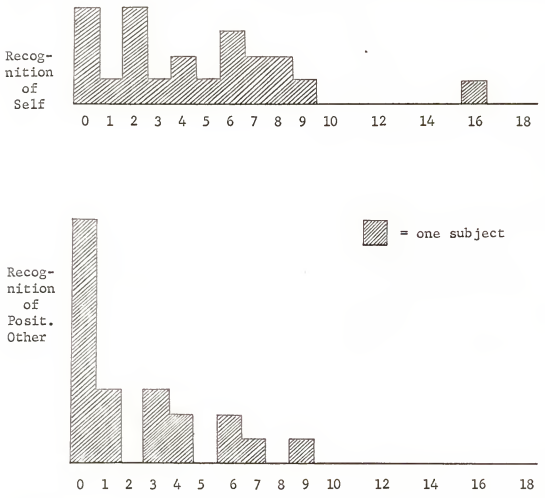
Preliminary Study Done with Seventh Grade Children at P. K. Yonge Laboratory School

This was an exploratory study with 22 seventh grade children (12 boys, 10 girls) from the P. K. Yonge Laboratory School of the University of Florida for the purpose of determining if a relationship exists between 1) a child's ability to recognize himself, two other classmates, and a physical stimuli from slide projections focused at various levels of difficulty; 2) a modified Embedded-figures Test; 3) a self-report on self esteem; 4) the sex of the child; and 5) I.Q.

The results indicated a significant positive relationship between performance on the modified Embedded-figures Test and recognition of 1) self, 2) a friend who had rated himself extremely high on a self rating scale, and 3) an inanimate object. Recognition of the peer who had rated himself low, I.Q., sex, and self report appeared to be unrelated to performance on the modified Embedded-figures Test.

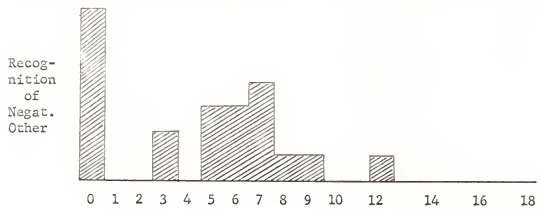
Sample of Recognition Test Items

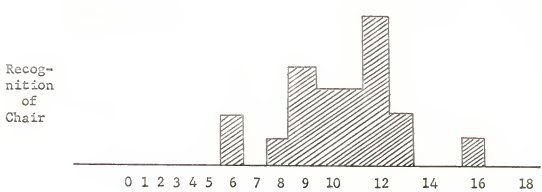
GROUP PERFORMANCE ON RECOGNITION TEST BY STIMULUS
(N = 22)



Recognition Test: The horizontal scale, 0 to 18, refers to the degree of difficulty at which subjects recognized stimulus. The number 18 designates recognition of an extremely blurred projection and one, complete clarity. The zero indicates a failure to recognize the stimulus under the best conditions possible. The number of subjects achieving a particular score is represented vertically.

GROUP PERFORMANCE ON RECOGNITION TEST BY STIMULUS
(Continued)





GROUP PERFORMANCE ON THE MODIFIED EMBEDDED-FIGURES TEST
(N = 22)

The modified Embedded-figures Test

= one subject

The modified Embedded-figures Test: The horizontal scale, 0 to 7, refers to the number of figures correctly identified by the subject. The number of subjects achieving a particular score is represented vertically.

CHI-SQUARE MATRIX
(N = 22)

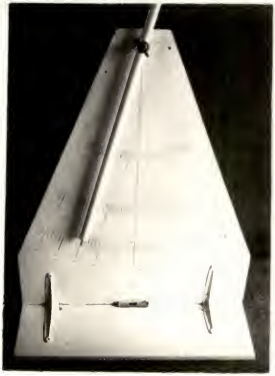
Items	1	2	3	4	5	6	7	8
1. Recognition of self		4.52*	8.92**	4.52*	1.64		.92	.20
2. Embedded-figures Test			4.52*	1.64	4.52*		.92	.20
3. Recognition of (+) other				4.52*	.20		3.06	.20
4. Recognition of (-) other					14.72***		.92	1.64
5. Recognition of Chair							3.06	1.64
6. I.Q.								
7. Sex								
8. Self Report								

*Sig. at .05.
**Sig. at .01.
***Sig. at .001.

I.Q. scores were collected on all but three of the subjects used in this study. Because of the unavailability of the three scores, Chi-Squares were not computed for the I.Q. It may be of interest, however, to know that the researcher did compute Chi-Squares for I.Q. on the assumption that the missing data would fall at the mean for the group. The results did not support any relationship between any of the variables and I.Q.

APPENDIX B

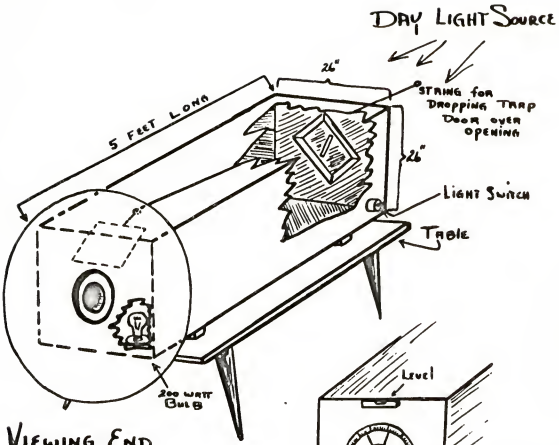
MRFT Pre-Trial Test



APPENDIX C

The Modified Rod and Frame Test

(MRFT)



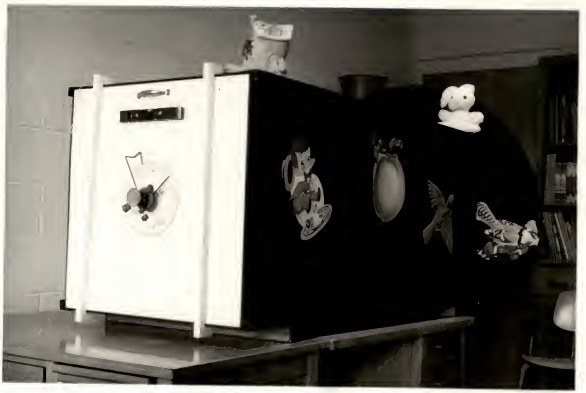
VIEWING END

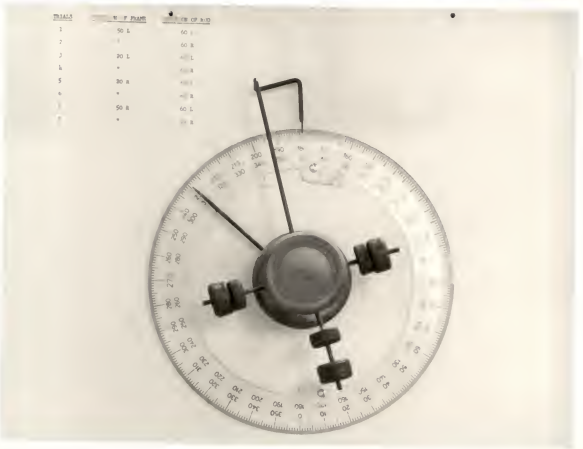
OPERATOR'S END

Box was Built of ¼ inch plywood... Painted Flat Black inside and out.

Circular plywood Covering on the front is 44 inches in Diameter

½ degree marks are available.



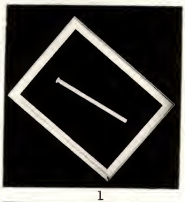


MRFT TRIALS

The trials given each subject are numbered on the following page, one through eight. The middle column was inserted for the reader's benefit as an illustration of what the subjects were being asked to do. The trials are as follows:

Trial	Frame Angle	Rod Angle
1	50° left	60° left
2	50° left	60° right
3	20° left	60° left
4	20° left	60° right
5	20° right	60° left
6	20° right	60° right
7	50° right	60° left
8	50° right	60° right

Note: All angles were measured from the vertical.



1

2

3

4

5

6

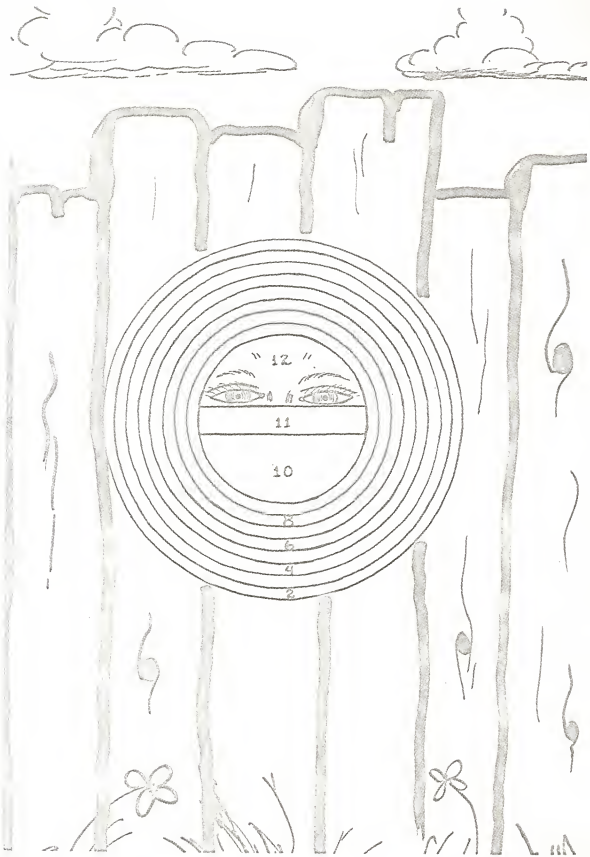
7

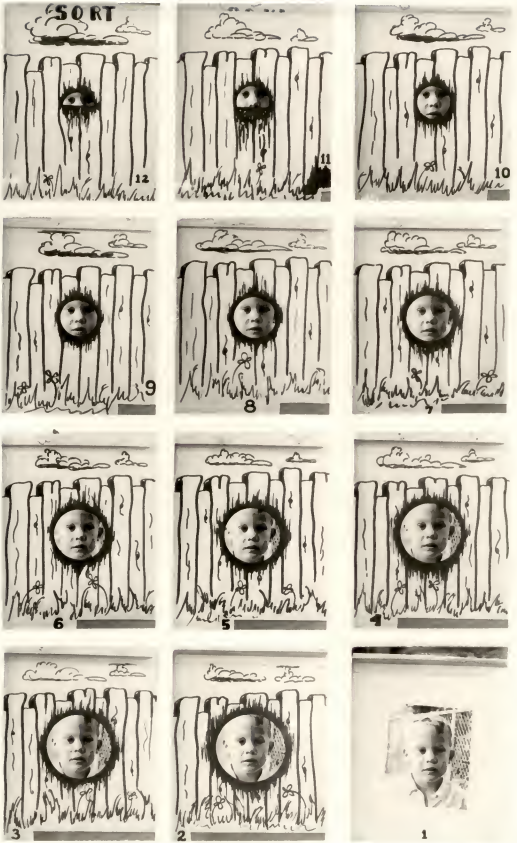
8

APPENDIX D

The Self-Other Recognition Test

(SORT)


" 12 "
11
10
8
6
4
2


SORT
12
11
10
9
8
7
6
5
4
3
2
1

APPENDIX E

Task Performance Record Sheets

Date_____

ROD AND FRAME TEST

Subject's Name_____ Code_____

Sex_____Level_____Race_____ Score_____

TRIAL	ERROR/TRIAL
1.	_____
2.	_____
3.	_____
4.	_____
5.	_____
6.	_____
7.	_____
8.	_____
	_____ TOTAL ERROR
	_____ AVERAGE ERROR

Date _____

Code_____ Self-Other Recognition Test

Subject's Name_____Grade Level_____Sex___

I PEERS (sex) (response)

1. _____ _____
2. _____ _____
3. _____ _____
4. _____ _____

II AUTHORITY FIGURES

(sex) (response)

1. _____ _____
2. _____ _____

III SELF

(response)

1. _____

SCORES

1) Grand Total _____
2) Total for I _____
3) Total for II_____
4) Total for III_____

Sub-Total for I

5) Same Sex _____
6) Opposite Sex_____

Sub-Total for II

7) Same Sex _____
8) Opposite Sex_____

Scores are recorded as averages.

F.....Female
M.....Male

APPENDIX F

Pilot Study

SORT

(N = 6)

Subject	P_f	P_f	P_m	P_m	P_m	A_f	A_f	A_f	A_m	S	Aver.
Lyle	1	6	5	7	--	6	4	9	2	7	4.7
Jordan	0	1	0	0	1	1	0	6	4	5	1.8
Tammy	--	9	9	8	10	11	8	12	9	8	8.4
Becky	--	0	3	0	0	--	--	--	--	3	1.2
Tom	1	9	8	8	0	--	--	--	--	12	6.3
Dickie	0	10	10	10	0	8	8	9	12*	8	7.5

All Ss were five years of age.
Perfect score would be 12

*The boy's father.

P_f ....Peer female.

A ....Authority figure.

S ....Self.

M R F T

(N = 12)

Age	Males	Females
Adult	.93	3.25
	1.06	
	2.25	
8 yrs.		8.37
7 yrs.		7.12
6 yrs.	8.75	
		15.37 28.06
5 yrs.	8.81	
4 yrs.		15.88
3 yrs.	21.50	

*Scores are the average error from true vertical.

APPENDIX G

Distribution of Witkin's Scores

TABLE 24

DISTRIBUTIONS OF SCORES IN EACH SERIES OF THE ROD-AND-FRAME TEST FOR MALES OF DIFFERENT AGES[a]

Mean Scores	Series 1						Series 2						Series 3					
	8	10	13	15	17	Adults	8	10	13	15	17	Adults	8	10	13	15	17	Adults
0 - 3.4			1		1	2				1	2	3			6	10	7	17
3.5- 7.4	1	1	5	8	8	18	2	1	9	8	5	7	3	3	12	8	13	17
7.5-11.4	4	6	12	5	7	12	1	4	5	1	6	12	2	7	7	5	3	10
11.5-15.4	1	4	3	4	1	4	3	2	6	6	4	11	3	5	1	1		1
15.5-19.4	3	4	6	5	2	8	6	7	5	4	3	6	7	6	3	1		2
19.5-23.4	6	1		1	3	4	7	6	3	2	3	7	7	2	1			4
23.5-27.4	10	10	2				7	8	1	2		6	4	7				1
27.5-31.4		1		2	1	1			1									
31.5-35.4		2				3		1		1								
35.5-39.4	1																	
39.5-43.4		1						1										
51.5-55.4			1															

a The N's for the different age groups are as follows: 8 = 26, 10 = 30, 13 = 30, 15 = 25, 17 = 23, adults = 52

(Witkin, 1954, p. 138)

TABLE 25

DISTRIBUTION OF SCORES IN EACH SERIES OF THE ROD-AND-FRAME TEST FOR FEMALES OF DIFFERENT AGES[a]

Mean Scores	Series 1						Series 2						Series 3					
	8	10	13	15	17	Adults	8	10	13	15	17	Adults	8	10	13	15	17	Adults
0 - 3.4			1						2						2	5	1	3
3.5- 7.4			4	5	5	5			4	7	1	3	1	3	10	11	9	10
7.5-11.4	2	4	7	4	7	8	1	3	7	2	8	5	2	6	8	6	10	13
11.5-15.4	1	5	3	7	4	11	1	3	7	4	7	9	1	2	5	1	4	8
15.5-19.4	2	2	7	6	6	11	3	6	5	4	5	11	3	2	2	1	1	11
19.5-23.4	2	4	2	1	3	5	4	7	1	4	3	7	5	5	1	1		3
23.5-27.4	16	8	3	2		6	15	9	2	4	1	10	12	9				1
27.5-31.4	2	6	2			1	2	1	1			1	2	2	1			
31.5-35.4	1					1	1					2		1				
35.5-39.4						1		1				1						1
39.5-43.4		1				1						1						1
43.5-47.4						1												
47.5-51.4	1																	

[a]The N's for the different age groups are as follows: 8 = 27, 10 = 30, 13 = 29, 15 = 25, 17 = 25, adults = 51.

(Witkin, 1954, p. 138)

APPENDIX H

Descriptive and Experimental Data

TABLE 26

DESCRIPTIVE AND EXPERIMENTAL DATA

Grade Level	Sex	No	C. Age	Pre-Trial (CAT)	MAPT Data 1	2	3	4	5	6	7	8	Sort Data Teacher Ranking: Peers Females	Peers Males	Peers Female	Guardians Male	Self
		1	5.3	.42	12.0	34.0	39.0	2.0	5.0	26.0	4.5	40.0	12	10	10	10	12	12	10
		2	5.2	.50	17.0	16.5	17.5	11.0	8.0	18.0	30.0	40.0	10	10	11	10	10	7	10
		3	5.0	.50	49.0	44.5	23.5	17.0	16.5	21.0	45.0	31.5	10	10	12	10	10	8	8
	Female	4	4.4	.90	31.0	39.5	18.0	11.0	8.0	11.5	41.5	44.0	10	10	10	10	10	6	10
		5	4.9	1.50	10.0	43.0	32.5	6.0	2.5	6.5	10.5	44.0	11	6	7	10	12	8	9
		6	5.4	1.21	49.0	43.0	28.0	8.0	25.0	47.5	44.0	44.0	11	11	11	10	12	12	10
		7	4.9	.42	10.5	5	24.0	7.5	10.5	10.0	21.5	14.0	9	10	12	12	11	9	8
		8	4.5	1.32	19.0	43.0	33.5	11.5	5	29.0	44.5	34.5	6	4	4	7	8	5	8
Kindergarten																			
		9	4.3	5.25	17.0	25.0	12.0	12.5	13.0	9.0	33.0	29.0	10	10	10	10	11	10	9
		10	5.5	.75	1.5	0.0	24.0	1.5	6.0	13.0	3.5	9.5	12	8	7	11	9	12	12
		11	5.2	.50	34.0	23.5	10.0	5.0	19.0	36.5	32.0	7	4	10	5	3	9	10	
	Male	12	4.8	1.00	7.0	4.5	2.0	1.5	2.5	4.0	14.0	3.0	11	10	11	9	10	10	12
		13	4.5	.25	38.0	15.5	1.0	22.0	15.0	37.0	34.0	2	7	10	10	6	4	6	1
		14	4.6	2.00	3.0	14.5	24.5	0.0	2.5	10.0	3.0	0	1	7	0	1	3	1	
		15	4.8	.75	14.0	44.0	17.0	7.0	15.5	12.5	8.0	15.0	8	2	8	4	7	10	12
		16	4.1	.75	35.5	47.0	45.0	21.0	34.0	45.0	45.0	44.0	6	0	8	7	0	0	5
		17	4.1	.87	21.0	26.0	23.5	18.5	13.5	20.0	11.5	13.0	6	8	8	8	10	5	10
		18	4.3	.75	40.3	44.5	38.5	13.0	5.5	25.0	45.5	12.0	10	12	10	10	10	8	10
	Female	19	5.9	.75	1.5	11.0	8.0	3.0	8.0	7.0	3.0	14.0	12	9	6	10	8	8	10
		20	4.1	.62	2.0	4.5	15.0	3.0	2.5	1/.0	11.5	11.5	12	8	5	6	11	7	6
		21	4.2	1.25	19.0	42.0	51.5	13.0	9.0	25.0	45.5	33.5	7	10	10	10	10	10	10
		22	4.5	1.50	6.5	13.5	13.5	14.5	1.0	20.5	0.0	0.0	0	7	8	6	6	6	10
First Grade																			
		23	5.6	.5	33.0	34.0	30.5	8.0	1.0	24.0	38.0	13.0	9	10	10	10	9	6	10
		24	5.8	.37	16.0	7.0	9.0	3.5	11.5	18.5	50.0	50.0	10	9	10	3	8	5	11
	Male	25	5.3	.50	4.0	30.0	2.5	5.0	24.0	10.5	46.0	6.0	7	7	12	6	4	5	11
		26	6.3	.25	1.5	10.0	22.0	13.5	16.5	18.5	10.0	8.0	6	12	6	4	10	7	10
		27	5.3	1.37	1.5	14.0	6.5	5.5	8.5	9.0	5.0	7.0	12	8	5	9	12	9	9
		28	6.2	.87	8.5	2.0	12.0	10.0	9.0	22.5	18.5	10	12	10	12	8	9	10	8
		29	6.7	1.00	8.0	1.5	23.5	12.0	19.0	24.5	47.5	52.0	12	11	10	11	10	10	10
		30	6.4	1.00	24.5	48.0	25.5	12.0	4.0	22.0	45.5	51.5	9	11	12	10	10	12	9
		31	6.5	0.62	21.0	8.5	4.5	25.0	21.0	10.0	13.0	19.5	6	8	6	8	8	7	9
	Female	32	7.5	.62	33.0	28.0	24.0	15.0	13.0	25.5	48.0	45.0	10	11	7	9	8	9	9
		33	6.5	1.37	17.0	7.5	32.0	12.0	24.0	39.5	30.0	30.0	10	8	8	10	9	10	11
		34	6.5	1.00	18.0	44.5	13.5	20.5	15.5	26.0	37.5	34.0	6	8	6	6	6	6	6
		35	6.8	.25	20.0	44.5	15.0	8.5	14.0	19.5	42.0	10.0	10	10	10	10	11	7	5
		36	7.0	.63	21.5	8.0	15.0	7.0	11.0	25.0	10.0	35.5	9	8	10	12	7	6	10
Second Grade																			
		37	6.5	.50	5.0	5.0	6.5	2.0	13.0	0.0	1.0	1.5	8	10	10	10	10	10	11
		38	8.5	.75	7.5	8.0	21.0	6.0	.5	12.0	11.0	10.0	10	12	9	8	12	10	10
		39	7.0	1.12	18.0	.5	35.5	8.0	4.0	17.5	19.0	30.0	8	10	5	5	7	9	12
	Male	40	8.0	.62	36.5	50.0	23.0	14.5	12.5	22.0	34.0	51.0	10	2	10	8	8	8	8
		41	7.0	1.25	5.5	1.0	10.5	9.5	9.0	21.0	3.0	13.0	9	6	6	9	6	7	10
		42	7.0	0.0	6.0	7.5	14.0	13.0	9.0	9.5	12.5	5.0	7	8	7	7	12	7	7
		43	7.2	.50	26.5	42.5	20.0	18.0	14.5	21.0	30.5	23.5	8	11	9	10	8	9	9
		44	7.5	1.00	25.0	44.0	21.5	15.0	12.5	25.0	44.0	51.0	7	10	8	10	6	5	10
		45	8.0	1.00	3.0	8.5	20.0	9.0	1.5	11.5	17.0	7.5	8	10	12	10	10	7	9
		46	8.0	.50	13.0	4.5	18.0	13.0	11.0	24.5	40.5	35.5	10	11	12	10	12	10	12
		47	7.9	.75	5.5	2.5	20.0	10.5	15.5	23.5	44.5	38.0	11	10	7	9	12	12	2
		48	8.5	.25	3.0	6.0	20.0	5.0	3.0	10.0	8.5	9.0	10	11	9	8	10	11	11
		49	7.5	1.12	6.5	8.5	15.0	7.0	15.0	19.5	6.0	7.5	7	11	11	12	10	5	7
	Female	50	7.6	.62	1.5	10.0	21.5	1.0	5.5	10.5	12.0	10.0	7	10	10	10	8	9	10
		51	10.9	1.12	10.0	4.5	26.0	14.0	23.5	40.0	30.0	40.0	10	10	7	6	12	9	10
		52	8.1	.62	13.0	3.0	12.0	5.5	9.0	12.5	6.5	6.5	7	8	8	5	8	7	-
		53	7.5	-	1.5	10.0	7.0	6.0	6.5	0.0	17.5	-	-	-	-	-	-	-	-
		54	9.9	-	21.0	37.5	23.0	10.0	10.0	21.0	16.5	14.0	-	-	-	-	-	-	-
		55	9.1	-	24.0	21.5	22.0	21.5	29.0	16.0	20.5	-	-	-	-	-	-	-	-
Third Grade																			
		56	7.7	0.0	5.0	0.0	6.5	1.0	2.0	6.5	4.5	.5	5	8	10	7	10	10	10
		57	7.7	.84	35.5	43.5	23.5	12.0	10.5	13.0	3.5	50.0	9	7	5	8	9	1	8
		58	8.5	.75	8.0	5.0	8.5	5.5	7.0	11.0	2.0	5.0	10	8	8	8	12	10	10
		59	8.1	1.87	10.0	12.0	14.5	15.0	11.0	21.5	5.0	5.5	9	11	12	9	10	11	11
		60	8.3	1.00	15.0	7.0	16.0	11.0	11.0	16.0	10.0	10.0	7	5	6	10	10	11	10
	Male	61	8.5	.37	13.0	10.0	5.5	15.0	9.0	14.0	4.0	27.0	7	6	10	9	10	5	10
		62	7.6	1.25	4.5	4.5	7.0	6.0	5.5	6.5	0.0	3.5	8	8	12	10	12	7	12
		63	7.8	1.25	2.0	1.0	5.5	1.5	.5	7.0	10.5	6.0	10	12	9	10	10	7	9
		64	9.0	-	.5	0.0	2.5	2.5	3.5	1.0	.5	-	-	-	-	-	-	-	-
		65	9.2	-	9.0	16.5	12.0	2.5	9.5	10.0	5.0	8.0	-	-	-	-	-	-	-
		66	9.1	-	19.5	10.5	20.0	17.0	21.5	23.0	42.0	39.0	-	-	-	-	-	-	-
		67	9.1	-	4.0	2.5	11.0	4.0	2.0	3.5	4.5	1.5	-	-	-	-	-	-	-
		68	8.8	-	9.0	5.0	23.5	6.0	4.0	14.0	17.5	9.0	-	-	-	-	-	-	-
	Female	69	8.8	-	17.5	5.0	19.5	5.0	8.5	13.0	12.5	5.0	-	-	-	-	-	-	-
		70	8.2	-	2.0	4.5	5.0	2.5	6.0	8.5	3.0	6.0	-	-	-	-	-	-	-
		71	9.3	-	17.0	11.5	23.5	13.0	21.5	42.5	49.0	-	-	-	-	-	-	-	-
Fourth Grade																			
		72	9.5	-	8.0	4.0	24.0	1.5	7.0	14.0	0.0	2.0	-	-	-	-	-	-	-
		73	9.3	-	0.0	.5	11.5	10.0	11.5	5.5	6.5	5.0	-	-	-	-	-	-	-
	Male	74	8.7	-	2.0	10.0	0.0	7.5	2.0	17.5	4.0	3.0	-	-	-	-	-	-	-
		75	9.5	-	0.0	7.0	4.5	10.5	16.0	12.0	0.0	2.5	-	-	-	-	-	-	-
		76	8.9	-	1.0	1.5	10.5	5.0	2.0	12.5	5.0	5.5	-	-	-	-	-	-	-

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BIOGRAPHY

Newell T. Gill was born in Butler, Pennsylvania, March 19, 1933. He graduated from Robert E. Lee High School in Jacksonville, Florida, in 1951. On June, 1955, he received both his B.A. degree with a major in Radio, Television, and Motion Pictures from the University of North Carolina and a Commission in the United States Navy. He returned to civilian life following three years of military service as a navy pilot. In 1959 he was hired as a pilot for American Airlines. During the first year with American, he was married to Suzy Minninger. Their first child, Richard Frederick, was born in the summer of 1960. In September of that same year Mr. Gill was furloughed from American for an indefinite period of time. It was during this lay-off that he had his first opportunity to teach in the public schools. On being recalled to American Airlines after a year and a half lay-off, he decided in favor of teaching as a profession. In the fall of 1961, he was admitted to the graduate school at the University of Florida. His focus of interest was in the area of educational psychology. In the spring of 1962, he and his wife had their second son, Michael Eric. In December, 1963, he received his Master's degree in Eudcation; and in December of 1964, his family was blessed with another son, Daniel Newell. Mr. Gill currently holds the position of Assistant Professor in the Department of Education and Psychology at Eastern Kentucky State College.

This dissertation was prepared under the direction of the chairman of the candidate's supervisory committee and has been approved by all members of that committee. It was submitted to the Dean of the College of Education and to the Graduate Council, and was approved as partial fulfillment of the requirements for the degree of Doctor of Education.

December 18, 1965

Kimball Wiles
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